DIVERSIFIED METAL FABRICATORS, INC.

Installation and Parts & Service Manual

RW-1420

May 2015

SERIAL NUMBER (FRONT) _____

SERIAL NUMBER (REAR) _____

NOTE:
Please refer to the serial numbers when ordering parts or inquiring about warranty items.

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SET-UP

I. Pre-Installation

NOTE:
Read all instructions and check that all required parts and Kits are included before beginning the installation. The proper installation of this equipment is solely the responsibility of you, the authorized installer. When in doubt, contact DMF for assistance.

Tools Required for Installation:

- Electric Welder (Arc or Mig)
- Hoist or Floor Jack
- Frame Drill w/5/8" Drill Bit
- General Mechanic Tools
- 8'L x 1-1/2"dia. Tube or Bar
- Protective Clothing
- Cutting Torch
- Hand Grinder
- Goggles

Supplied Parts Check List:

Part	Qty.
Manuals (P.& S. and Install) (Including Decal Package)	1
Front RW-1420 Rail Gear	1
Rear RW-1420 Rail Gear	1
Rear Mounting Plates (4"X 6"X ½" w/4 Holes)	2
Front Frame Extensions (if Required)	2
Front Valve Plate Assembly w/Hydraulic Hoses & 2 Push Button Switch (1 Installed)	1
Monarch Hydraulic Power Unit Assembly	1
1/0 Power Cable X 86" w/lugs	1

Optional Parts Check List:

Part	Qty.
Rail Sweeps (Front) (Right or Left or Axle Set)	1 each
Rail Sweeps (Rear) (Right or Left or Axle Set)	1 each
Remote Pin/Off Assembly (on Rear Rail Gear)	2 each
Remote Pin/Off Cable w/T-Handle	2 each
Hydraulic Brake Assembly (Front or Rear) (Right or Left)	1 each
Hydraulic Brake Control System (Front and/or Rear)	1 each
Air Brake Assembly (Front or Rear) (Right or Left)	1 each
Air Brake Control System (Front and/or Rear)	1 each
Steering Wheel Lock Kit	1 each
Shim Kit for Rear Bracket (12"x 12"-2 ea.1/8,1/4 & 3/8")	1 kit

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Additional Material that may be Required:

Item	Qty.
Hydraulic Hose (Appropriate Size & Rating for System)	As Required
Swivel Hose Ends (Appropriate Size & Rating for System)	As Required
Diverter Valve (Appropriate Size & Rating for System)	As Required
Hydraulic Oil – Unax RX-46 (or Equivalent)	As Required
Bolts & Lock Nuts – 5/8”-18 Gr.8 (if Frame Extensions are Required)	As Required
Bolts & Nylock Nuts – 5/8”-11 Gr.5 (Rear Mounting Bracket Plates)	8 each
Steel Channel, 3” wide x 4’ long (for Front Installation Rails)	2 each
Steel Channel, 3” wide x 10’ long (for Front Installation Rails)	2 each
Steel Flat Bar, 1/2”x 3”x 56-1/2” long (for Installation Rails)	4 each
Steel Square Tube, 6”x 6”x 3/8”x 12” long (Temporary Spacer)	2 each

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II. "ABS" Brake System

Trucks Equipped With "ABS" Brake System

All medium and heavy duty trucks manufactured after March 1, 1998, and equipped with air brakes, are required by federal law to also include "**ABS**" ("Anti-Lock Brake System"). The system is designed to prevent wheel lock-up and jackknifing during braking. It also provides increased vehicle stability and driver control.

The "**ABS**" consists of wheel speed sensors, an "**ECU**" (electronic control unit) and all wiring and airlines that link the "**ABS**" components to the brakes and the truck's electrical system.

During braking, the sensors will detect if one or more of the wheels are locking and automatically engage the "**ABS**". The "**ECU**" then signals the system to apply and release brake pressure as much as 15 times per second, allowing the wheel(s) to turn just enough to maintain optimum traction.

Vehicles equipped with "WABCO" or "Allied-Bendix" "**ABS**" have an amber dash- mounted warning / diagnostic lamp. During normal road operation, the lamp will come ON when the truck engine is started and, depending on the type of system, will go OFF after about 3 seconds or when the truck reaches a speed of approximately 5-7 mph. A self -diagnostic check of the "**ABS**" is conducted during this time. If the lamp stays on, or comes on any other time during road operation, a possible malfunction is indicated, which will shut off only the part of the system at fault. The affected wheel(s) will revert back to conventional braking. For complete information and instructions relative to the "**ABS**" system, please refer to the truck's 'operation manual'.

Rail Operation of Trucks with "ABS" Brake System Active

While operating on track with the railgear down, the "**ABS**" becomes ineffective in brake application at lower speeds. If the "**ABS**" is active and the truck moving on rail with front wheels elevated, the amber dash light may come on. Since the front wheels are not rotating, the motion sensors may transmit a fault indication to the "**ABS**", which signals the dash lamp to illuminate inadvertently. This will not affect rear truck braking or rail wheel braking, if applicable. When the truck is returned to road operation, the "**ABS**" fault must be cleared, by turning the engine off and re-starting. At this time the diagnostic check will repeat as stated above.

NOTE:
This procedure is applicable only to "WABCO" and "Allied-Bendix" "ABS" Brake Systems. For any other "ABS" Brake System, contact DMF for assistance.

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III. Initial Instructions

Work Area:

The area in which the Railgear installation is to occur should meet minimum requirements in order to facilitate the process and provide adequate conditions in which the work can be completed safely, accurately and in a timely manner.

- Floor - The floor should be level in order to provide good measurements required to check the alignment of the Railroader.
- Lighting - The work area should be adequately lighted.
- Space - There should be enough space to maneuver the Railroader components into position and to safely work around other equipment.

Truck Condition:

Before installation, the truck should be checked in some important areas.

- Tires - The tire pressure should be checked for the manufacturer's recommended inflation and for consistent pressure readings from all the tires. This will ensure correct traction of the tires on the rails. Also the condition of the rear tires needs to be determined. If the rear tires are worn, they should be replaced.
- Alignment - Rear truck axle must be square with truck frame. DMF recommends that a reputable alignment shop check this. 0-degree thrust angle (which can be different than the factory specification) is required for proper Railroader operation.
- Frame & Suspension - On a new truck, these should be in good condition. On a used truck, the frame should be inspected to insure that it has not been damaged or bent. The suspension bushings should also be examined for excessive wear and replaced if necessary. If any problems in these areas are not corrected, it will cause difficulties aligning and operating the rail gear.
- Transverse Torque Rods - On vehicles that will regularly experience high center of gravity loads on rail (e.g. spray trucks, material loaders), it is advisable to install rear tandem control rods to limit transverse axle displacement. This is also necessary of long wheel base vehicles to limit front tandem walking off in curves.

Front and Rear Installation Rails:

In order to install the Railroader to get proper tire traction on the rail, it is necessary that standard gauge rails or Installation Rails be fabricated from 3" square tubing per Figure. 1-5 Drive the truck into the work area (pulling forward and back several times to align the axles) and up onto the Rear Installation Rails. The rear inside tires should be on the rails with the rear outside tires off the floor. The Front Installation Rails are not needed at this point.

NOTE:
Before proceeding, be certain that the front truck tires are chocked and the brakes are set.

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1.0 RAILGEAR COMPONENTS & GENERAL INFORMATION

1.1 Front Railgear

Figure 1-1 shows the individual parts of the installed front Railgear with the Rail Wheels in the rail position (down). The item descriptions will be used throughout this installation manual. DMF Railgear assemblies are also referred to as guide wheels, rail wheels or railroaders.

Figure 1-1

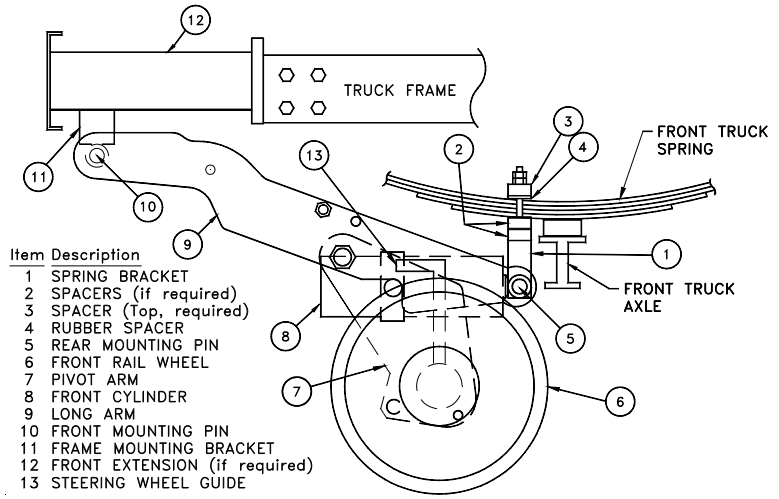
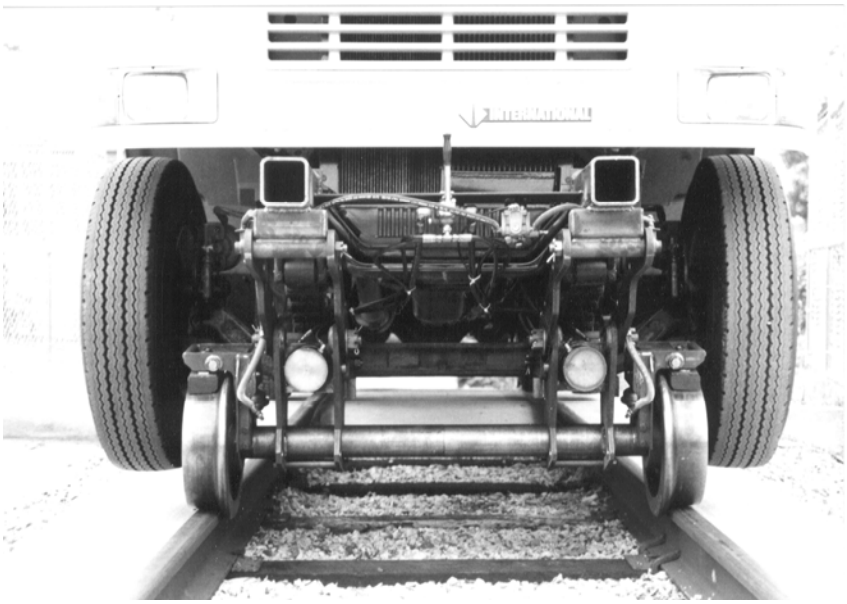


Figure 1-2



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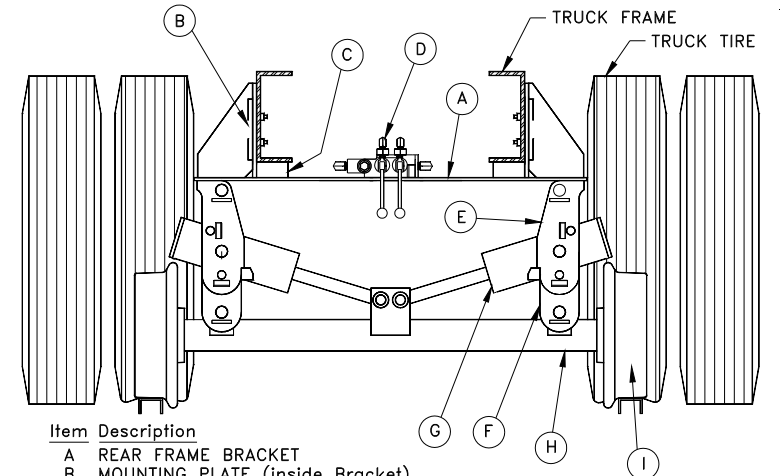
1.2 Rear Railgear

Figure 1-3 shows the individual parts of the installed rear Railgear with the Rail Wheels in the rail position (down). The item descriptions will be used throughout this installation manual.

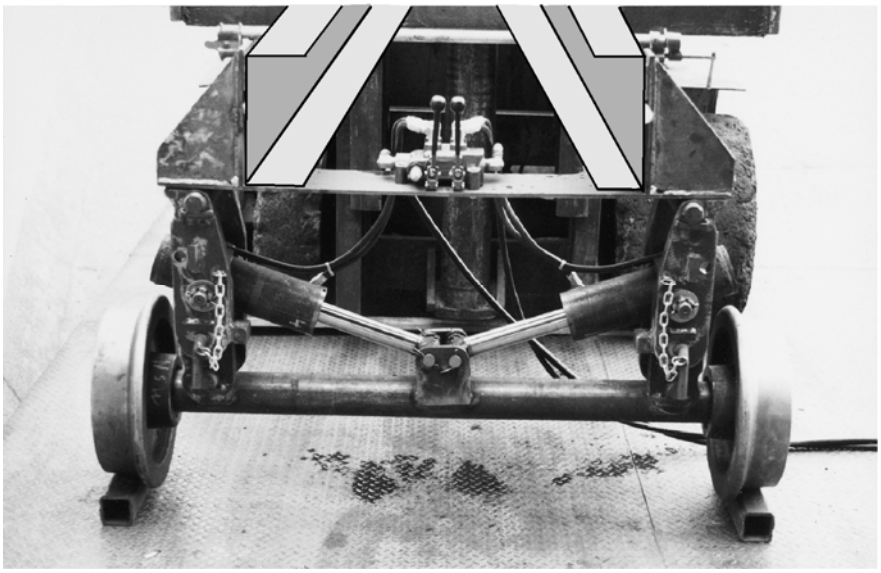
Figure 1-3



Item	Description
A	REAR FRAME BRACKET
B	MOUNTING PLATE (inside Bracket)
C	SPACER (if required)
D	REAR VALVE ASSEMBLY
E	UPPER LINK
F	LOWER LINK

Item	Description
G	REAR CYLINDER
H	REAR AXLE
I	REAR RAIL WHEEL

Figure 1-4



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1.3 Railgear Installation Rails

In order to install the Railroader to get proper tire traction on the rail, it is necessary that standard gauge rails or Installation Rails be fabricated from 3" standard channel per Figure 1-5.

Drive the truck into the work area (pulling forward and back several times to align the axles) and up onto the Rear Installation Rails. The rear inside tires should be on the rails with the rear outside tires off the floor. The Front Installation Rails are not needed at this point.

NOTE:
Before proceeding, be certain that the front truck tires are chocked and the brakes are set.

Figure 1-5

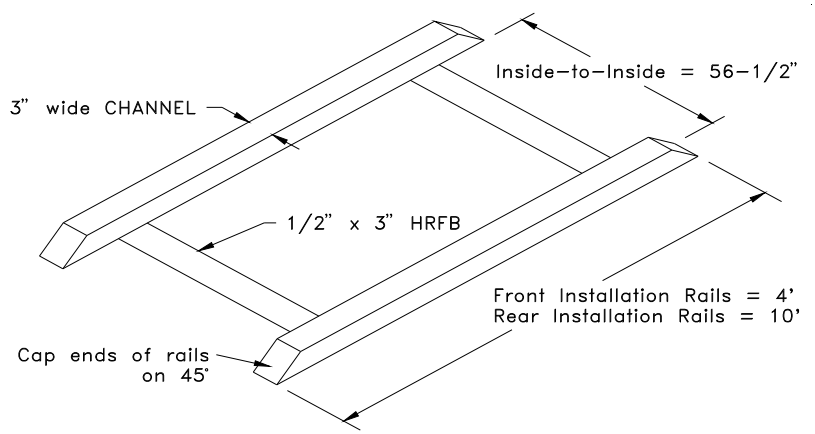
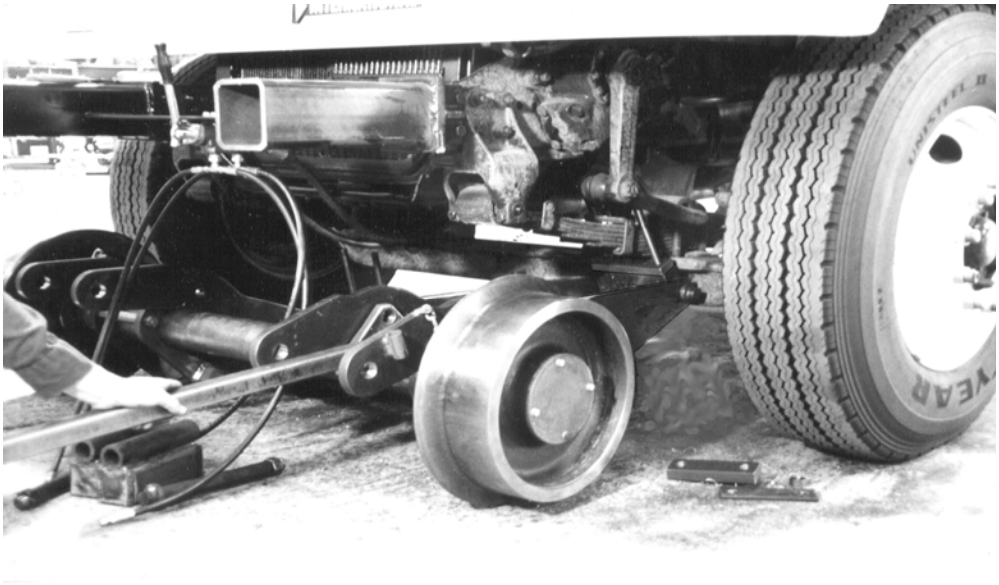

Inside–to–Inside = 56–1/2"
3" wide CHANNEL
1/2" x 3" HRFB
Front Installation Rails = 4'
Rear Installation Rails = 10'
Cap ends of rails on 45°

Figure 1-6



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1.4 Preliminary Installation

Remove the truck front bumper.

Bolt the Frame Extension to the truck frame (refer to Figure 1-1 & Figure 1-2). Make sure that tilt cabs of hoods will clear the Frame Extensions. Trim the brackets and re-gusset them if necessary. All truck Frame Extensions that are bolt-on brackets must use 5/8”-18 (fine thread) bolts, hardened steel washers and Grade 8 prevailing torque locknuts. All of the 5/8-18 Gr. 8 fasteners should be tightened per Purchased Fastener Torque Specification Table (Dwg. # PP006) in Appendix A. Check that the Frame Extension tubes are level front to rear and side to side with the frame.

NOTE:
DMF front frame extensions are designed to support the front hi-rail gear, only. It is the installer’s responsibility to properly engineer bracketry for rail racks, boom rests, etc.

In normal applications, mount the Front Valve Plate Assembly between the Frame Extensions (with the Energy Valve on the underside and the handle facing forward) and weld in place. In case this is not possible, mount Valve Assembly in the most appropriate and easily accessible location.

NOTE:
If the vehicle has been supplied with an integral extended front frame (or set back front axle), the Frame Extensions will not be required. The Front Valve Plate can be attached directly to the extended truck frame.

Roll the Rear Railgear up on the Rear Installation Rails under the truck frame in the back. The rear rail gear is usually installed with the Safety Pin-Offs (either manual, cable or air operated) towards the rear. However, truck body work may dictate locating the Pin-Offs on the front side. (If the Rear Pin-Offs must be located toward the front and the Railgear is supplied with insulated Rail Wheels, make sure to swap the left and right Rail Wheels. The insulated Rail Wheels should always be on the driver’s side of the rail gear.) The unit can be leaned upright against the truck frame (block the wheels to prevent movement) during the hydraulic system connection.

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2.0 HYDRAULIC SYSTEM CONNECTION

2.1 New Hydraulic System

- If only DMF Railroaders are to be installed and there is not an existing hydraulic system, outfit the truck with the supplied 12 Volt DC power unit. This unit will be used to actuate the railgear raise and lower cylinders only. Refer to schematics on the following pages.
- Mount the Power Unit Assembly in the desired location. This might be under the hood, behind the cab, under/behind the steps to the cab or another location that will provide suitable vandal protection. Connect the large stud on the Power Unit solenoid to the battery with the supplied 1-0 cable. Connect the (grounding) control terminal on the solenoid to an ignition switch energized push button switch to be located near each manual valve. When either push button is held down the power unit should function.
- The hoses that connect the directional valves to the cylinders are supplied in the kit. All hoses to/from the Power Unit and between the valves are to be supplied by the installer. All hoses are to be SAE 100R1 (1 wire braid) -4 with female swivel JIC-4 ends.
- Using a pair of 38” hoses supplied loose in the kit, connect the rod end of each front cylinder to **one** working port on the front manual directional valve with a #4 JIC tee. Use the other pair of 38” hoses to connect the blind ends of the cylinders to the **other** work port.
- The rear valve is pre-plumbed to the cylinders and mounted on the rear mounting bracket. This may be relocated as required.
- Plumb from the pressure port on the Power Unit to the inlet of the front directional valve. Plumb from the outlet of the front directional valve to the inlet of the rear directional valve; and, from the outlet of the rear directional valve to the tank return fitting on the Power Unit.

******WARNING******

Be certain that the front and rear valves are plumbed correctly. Each valve port is marked "IN" or "OUT". Plumbing the valves backward will cause an unsafe condition, possible injury and/or damage.

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2.2 Hydraulic System with Brakes

NOTE:
The rail wheel brake system is intended to assist the existing vehicle brakes when in the rail mode. As the vehicle rear tires are in contact with the railhead, the primary braking effort is derived from the rubber tires. Rail wheel brakes alone are insufficient to stop the vehicle in a reasonable distance.

- Kits supplied with guidewheel brakes have the Power Unit plumbed to the braking valves. The Power Unit Assembly will be used to operate the railgear to raise and lower functions and operate the guidewheel brakes. Refer to schematics on the following pages.
- Install the hydraulic system as in the basic system above; however, Plumb from the pressure port on the Power Unit to port P on the solenoid diverter brake valve. Plumb from port DH on the solenoid diverter brake valve to the inlet of the front directional valve.

2.3 Hydraulic Brakes Only

NOTE:
The rail wheel brake system is intended to assist the existing vehicle brakes when in the rail mode. As the vehicle rear tires are in contact with the railhead, the primary braking effort is derived from the rubber tires. Rail wheel brakes alone are insufficient to stop the vehicle in a reasonable distance.

- If the chassis has been outfitted with a PTO hydraulic system, The railgear raise and lower function may be plumbed into that system. Using an appropriately sized manual diverter valve (such as a Gresen S-50) the railgear may be tapped into the loop and plumbed as in section 2.1 above.
- To operate the railgear brakes the 12 Volt DC Power Unit may be used to operate the braking circuit only. This prevents having to run the PTO circuit while traveling down the rail.
- Install the Power Unit and connect to the battery as above. Plumb from the outlet of the brake system pressure control valve to the brakes per the OPTIONS section that follows.

******WARNING******
Railroader valves have built-in pressure reliefs and the hydraulic working pressure of the system is 2000 psi. The front valve is preset to 2000 psi at the relief. The rear valves are preset to 1500 psi and all other parts supplied by DMF are rated to 2500 psi. Care must be exercised that the relief in any of the valves is not inadvertently exceeded. It is possible for a relief to be adjusted much higher than it's valve can withstand. To ensure correct system pressure, check with a gauge.

- Fill the Power Unit tank with Dextron II ATF.
- Hold the front push button down while spooling the front valve. Operate the front railgear to fill the cylinders with fluid (remember to re-fill the tank).
- Repeat the procedure for the rear railgear.

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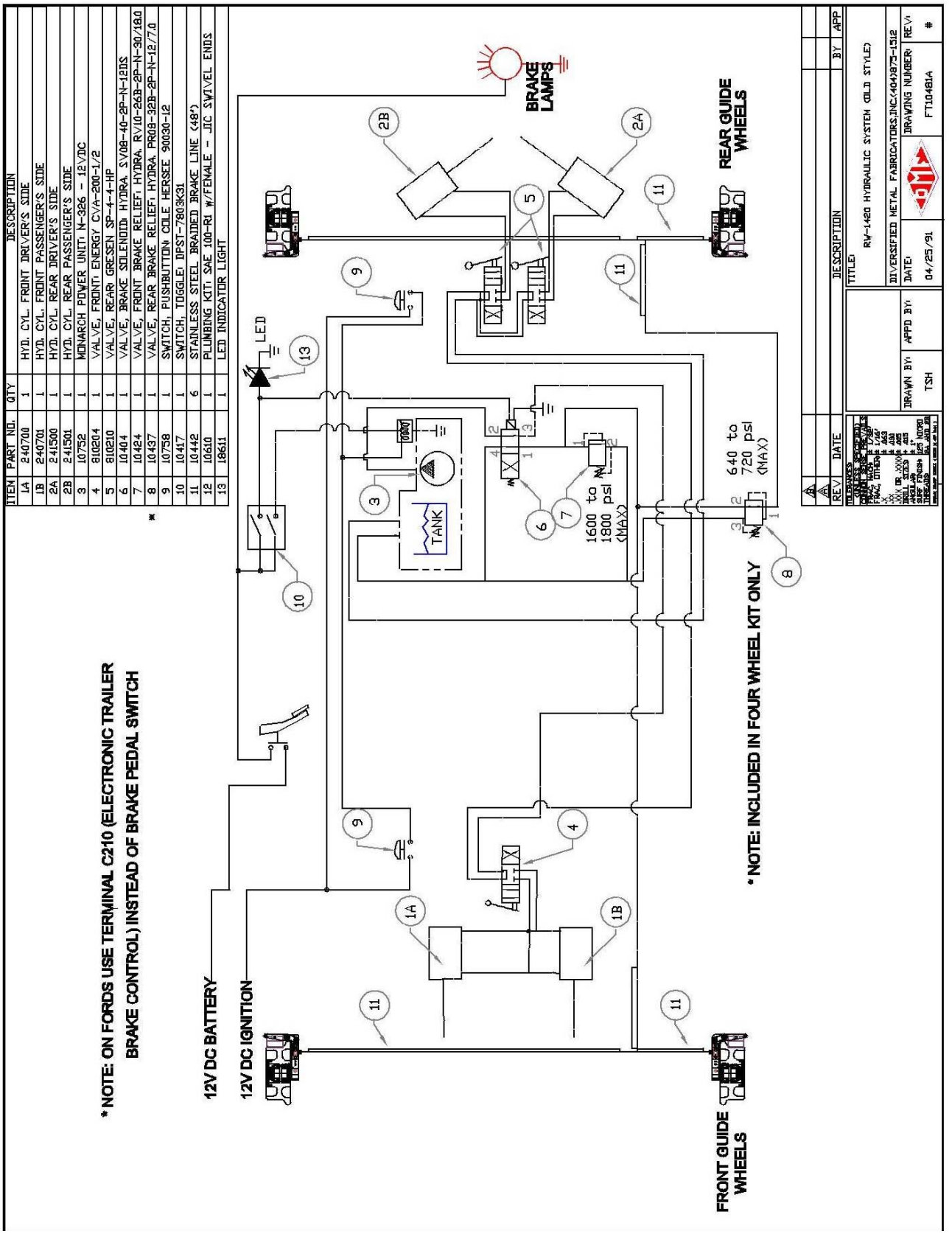
Drawing: Hydraulic System (Old Style)


ITEM | PART NO. | QTY | DESCRIPTION
1A | 240700 | 1 | HYD. CYL. FRONT DRIVER'S SIDE
1B | 240701 | 1 | HYD. CYL. FRONT PASSENGER'S SIDE
2A | 241500 | 1 | HYD. CYL. REAR DRIVER'S SIDE
2B | 241501 | 1 | HYD. CYL. REAR PASSENGER'S SIDE
3 | 10732 | 1 | MONARCH POWER UNIT: N-326 - 12VDC
4 | 810204 | 1 | VALVE, FRONT ENERGY CVA-200-1/2
5 | 810210 | 1 | VALVE, REAR GRESEN SP-4-4-HP
6 | 10404 | 1 | VALVE, BRAKE SOLENOID HYDRA SV08-40-2P-N-12DS
7 | 10424 | 1 | VALVE, FRONT BRAKE RELIEF: HYDRA. RV10-26B-2P-N-30/18.0
8 | 10437 | 1 | VALVE, REAR BRAKE RELIEF: HYDRA. PR08-32B-2P-N-12/7.0
9 | 10758 | 1 | SWITCH, PUSHBUTTON COLE HERSEE 90030-12
10 | 10417 | 1 | SWITCH, TOGGLE DPST-7803K31
11 | 10442 | 6 | STAINLESS STEEL BRAIDED BRAKE LINE (48")
12 | 10610 | 1 | PLUMBING KIT: SAE 100-R1 W/FEMALE - JIC SWIVEL ENDS
13 | 18611 | 1 | LED INDICATOR LIGHT
* NOTE: ON FORDS USE TERMINAL C210 (ELECTRONIC TRAILER BRAKE CONTROL) INSTEAD OF BRAKE PEDAL SWITCH
12V DC BATTERY
12V DC IGNITION
FRONT GUIDE WHEELS
REAR GUIDE WHEELS
BRAKE LAMPS
LED
TANK
1600 to 1800 psi (MAX)
640 to 720 psi (MAX)
* NOTE: INCLUDED IN FOUR WHEEL KIT ONLY
REV | DATE | DESCRIPTION | BY | APP
TITLE: RW-1420 HYDRAULIC SYSTEM (OLD STYLE)
DIVERSIFIED METAL FABRICATORS,INC.(404)875-1512
DRAWN BY: TSH
APPD BY:
DATE: 04/25/91
DRAWING NUMBER: FT10481A
REV: #

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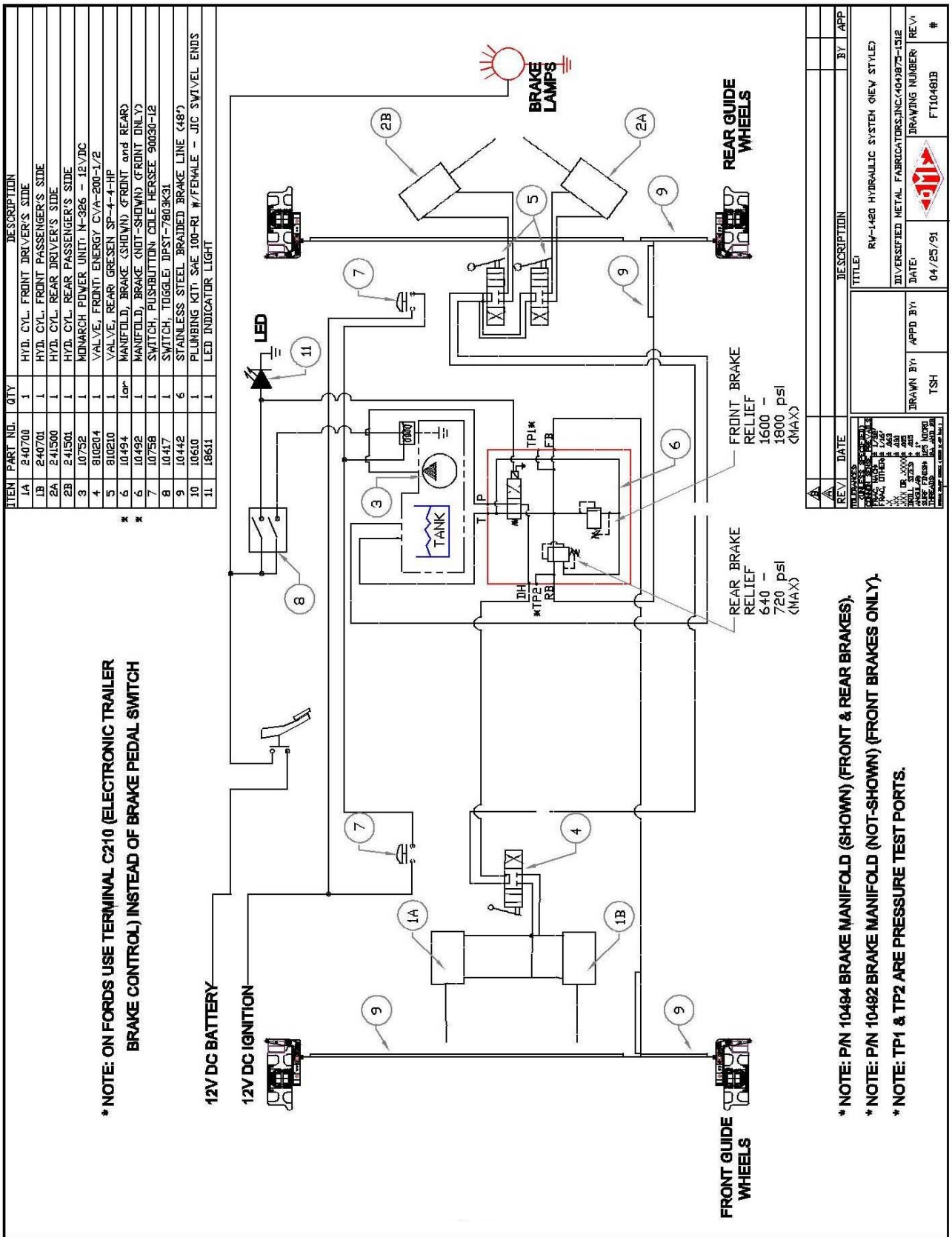
Drawing: Hydraulic System (New Style)


ITEM | PART NO. | QTY | DESCRIPTION
1A | 240700 | 1 | HYD. CYL. FRONT DRIVER'S SIDE
1B | 240701 | 1 | HYD. CYL. FRONT PASSENGER'S SIDE
2A | 241500 | 1 | HYD. CYL. REAR DRIVER'S SIDE
2B | 241501 | 1 | HYD. CYL. REAR PASSENGER'S SIDE
3 | 10732 | 1 | MONARCH POWER UNIT: M-326 - 12VDC
4 | 810204 | 1 | VALVE, FRONT ENERGY CVA-200-1/2
5 | 810210 | 1 | VALVE, REAR GRESEN SP-4-4-HP
6 | 10494 | 1or | MANIFOLD, BRAKE (SHOWN) (FRONT and REAR)
* 6 | 10492 | 1 | MANIFOLD, BRAKE (NOT-SHOWN) (FRONT ONLY)
7 | 10758 | 1 | SWITCH, PUSHBUTTON: COLE HERSEE 90030-12
8 | 10417 | 1 | SWITCH, TOGGLE: DPST-7803K31
9 | 10442 | 6 | STAINLESS STEEL BRAIDED BRAKE LINE (48")
10 | 10610 | 1 | PLUMBING KIT: SAE 100-R1 W/FEMALE - JIC SWIVEL ENDS
11 | 18611 | 1 | LED INDICATOR LIGHT
* NOTE: ON FORDS USE TERMINAL C210 (ELECTRONIC TRAILER BRAKE CONTROL) INSTEAD OF BRAKE PEDAL SWITCH
12V DC BATTERY
12V DC IGNITION
FRONT GUIDE WHEELS
REAR GUIDE WHEELS
BRAKE LAMPS
LED
TANK
FRONT BRAKE RELIEF 1600 - 1800 psi (MAX)
REAR BRAKE RELIEF 640 - 720 psi (MAX)
* NOTE: P/N 10484 BRAKE MANIFOLD (SHOWN) (FRONT & REAR BRAKES).
* NOTE: P/N 10492 BRAKE MANIFOLD (NOT-SHOWN) (FRONT BRAKES ONLY).
* NOTE: TP1 & TP2 ARE PRESSURE TEST PORTS.
REV | DATE | DESCRIPTION | BY | APP
TITLE: RW-1420 HYDRAULIC SYSTEM (NEW STYLE)
DIVERSIFIED METAL FABRICATORS,INC.(404)875-1512
DRAWN BY: TSH
APPD BY:
DATE: 04/25/91
DRAWING NUMBER: FT10481B
REV: #

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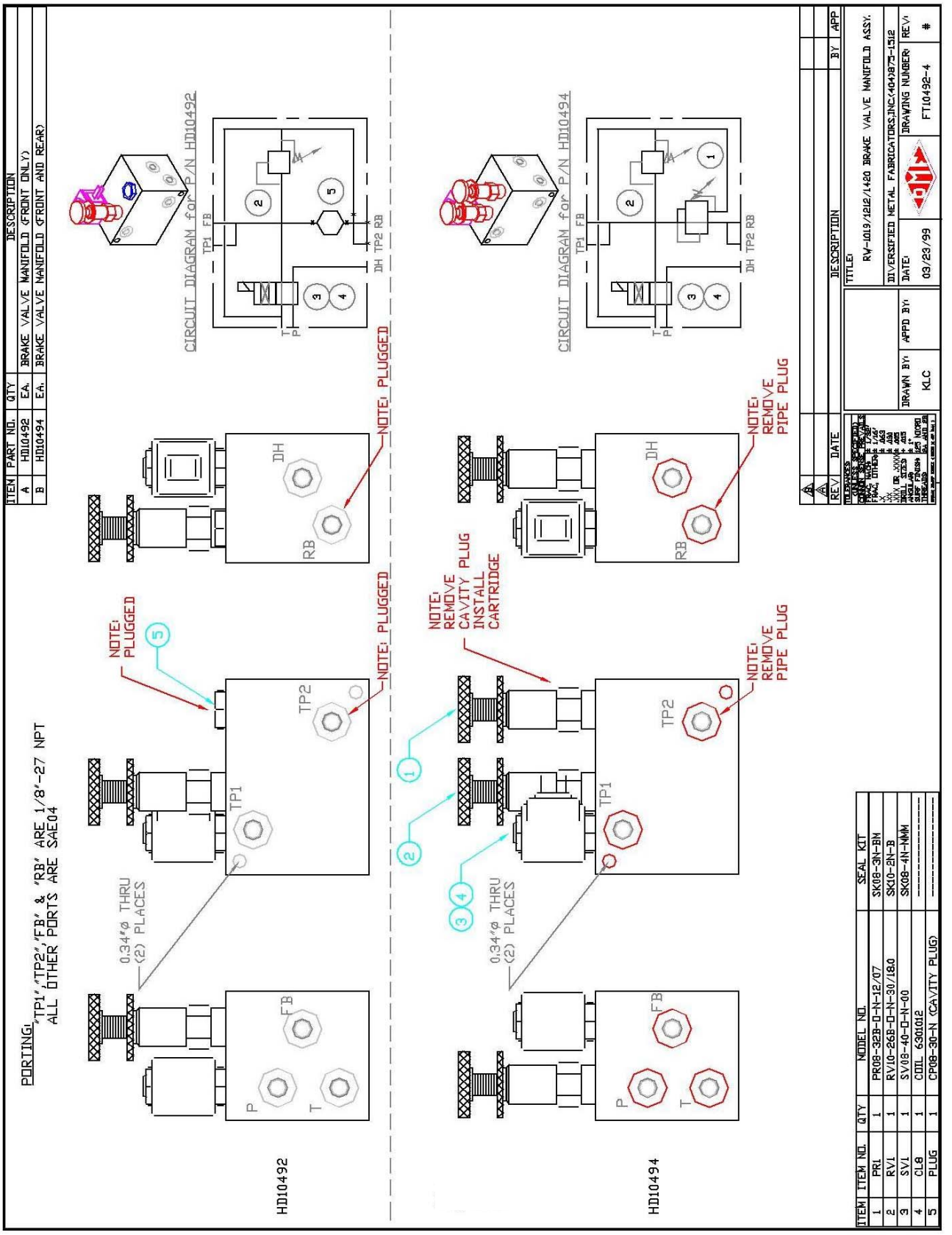
Drawing: Brake Valve Manifold Assembly


ITEM PART NO. QTY DESCRIPTION
A HD10492 EA. BRAKE VALVE MANIFOLD (FRONT ONLY)
B HD10494 EA. BRAKE VALVE MANIFOLD (FRONT AND REAR)
PORTING: "TP1","TP2","FB" & "RB" ARE 1/8"-27 NPT
ALL OTHER PORTS ARE SAE04
CIRCUIT DIAGRAM for P/N HD10492
CIRCUIT DIAGRAM for P/N HD10494
NOTE: PLUGGED
NOTE: REMOVE CAVITY PLUG INSTALL CARTRIDGE
NOTE: REMOVE PIPE PLUG
0.34"ø THRU (2) PLACES
HD10492
HD10494
ITEM ITEM NO. QTY MODEL NO. SEAL KIT
1 PR1 1 PR08-32B-D-N-12/07 SK08-3N-BN
2 RV1 1 RV10-26B-D-N-30/180 SK10-2N-B
3 SV1 1 SV08-40-D-N-00 SK08-4N-NMM
4 CL8 1 COIL 630102 ----------
5 PLUG 1 CP08-30-N (CAVITY PLUG) ----------
REV DATE DESCRIPTION BY APP
TITLE: RW-1019/1212/1420 BRAKE VALVE MANIFOLD ASSY.
DIVERSIFIED METAL FABRICATORS,INC.(404)875-1512
DRAWN BY: KLC
APPD BY:
DATE: 03/23/99
DRAWING NUMBER: FT10492-4
REV: #

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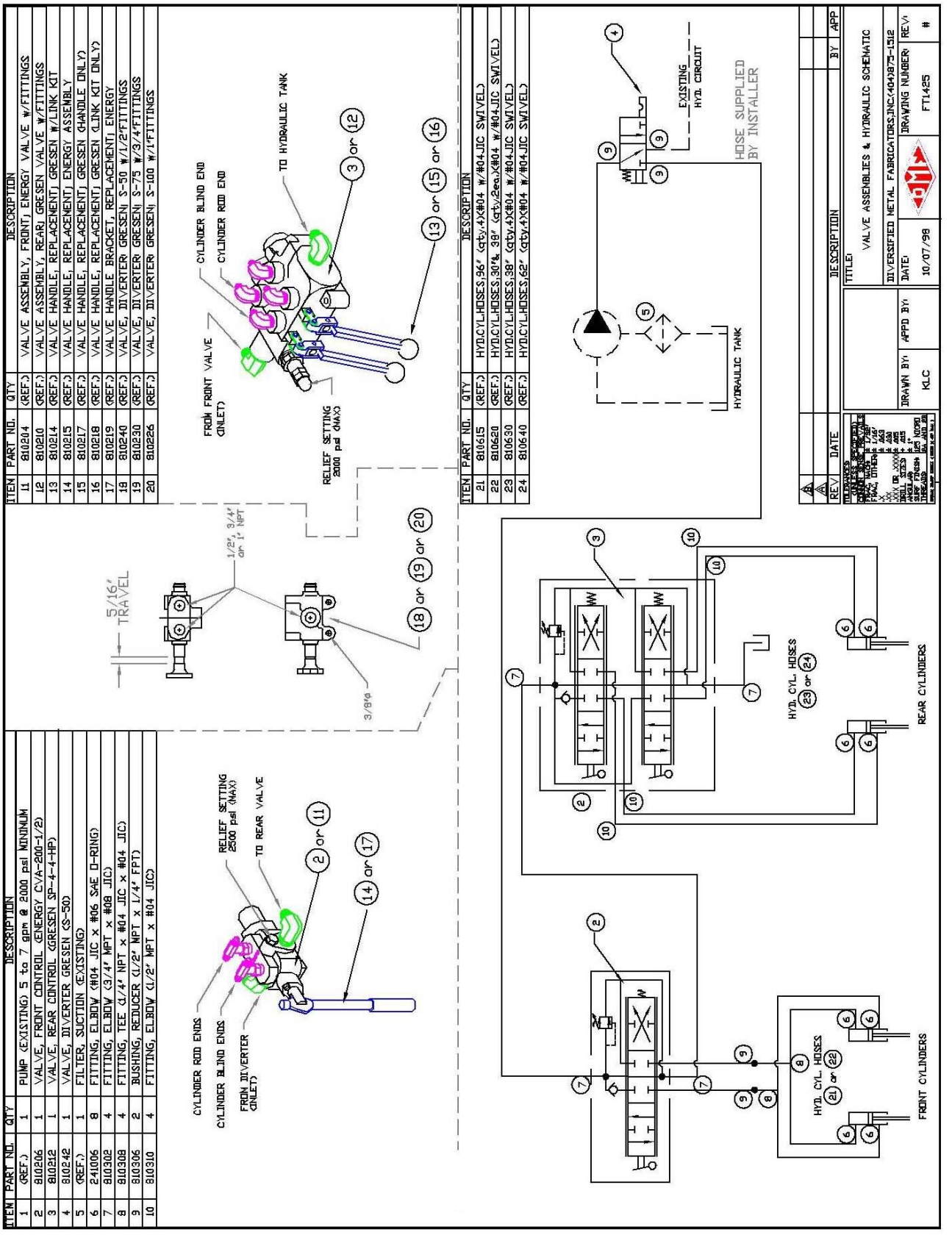
Drawing: Valve Assemblies & Hydraulic Schematic


ITEM PART NO. QTY DESCRIPTION
1 (REF.) 1 PUMP (EXISTING) 5 to 7 gpm @ 2000 psi MINIMUM
2 810206 1 VALVE, FRONT CONTROL (ENERGY CVA-200-1/2)
3 810212 1 VALVE, REAR CONTROL (GRESEN SP-4-4-HP)
4 810242 1 VALVE, DIVERTER GRESEN (S-50)
5 (REF.) 1 FILTER, SUCTION (EXISTING)
6 241006 8 FITTING, ELBOW (#04 JIC x #06 SAE O-RING)
7 810302 4 FITTING, ELBOW (3/4" MPT x #08 JIC)
8 810308 4 FITTING, TEE (1/4" NPT x #04 JIC x #04 JIC)
9 810306 2 BUSHING, REDUCER (1/2" MPT x 1/4" FPT)
10 810310 4 FITTING, ELBOW (1/2" MPT x #04 JIC)
ITEM PART NO. QTY DESCRIPTION
11 810204 (REF.) VALVE ASSEMBLY, FRONT, ENERGY VALVE W/FITTINGS
12 810210 (REF.) VALVE ASSEMBLY, REAR, GRESEN VALVE W/FITTINGS
13 810214 (REF.) VALVE HANDLE, REPLACEMENT, GRESEN W/LINK KIT
14 810215 (REF.) VALVE HANDLE, REPLACEMENT, ENERGY ASSEMBLY
15 810217 (REF.) VALVE HANDLE, REPLACEMENT, GRESEN (HANDLE ONLY)
16 810218 (REF.) VALVE HANDLE, REPLACEMENT, GRESEN (LINK KIT ONLY)
17 810219 (REF.) VALVE HANDLE BRACKET, REPLACEMENT, ENERGY
18 810240 (REF.) VALVE, DIVERTER GRESEN, S-50 W/1/2"FITTINGS
19 810230 (REF.) VALVE, DIVERTER GRESEN, S-75 W/3/4"FITTINGS
20 810226 (REF.) VALVE, DIVERTER GRESEN, S-100 W/1"FITTINGS
ITEM PART NO. QTY DESCRIPTION
21 810615 (REF.) HYD.CYL.HOSES,96" (qty.4)X#04 W/#04-JIC SWIVEL)
22 810620 (REF.) HYD.CYL.HOSES,30"& 38" (qty.2ea.)X#04 W/#04-JIC SWIVEL)
23 810630 (REF.) HYD.CYL.HOSES,38" (qty.4)X#04 W/#04-JIC SWIVEL)
24 810640 (REF.) HYD.CYL.HOSES,62" (qty.4)X#04 W/#04-JIC SWIVEL)
FROM FRONT VALVE (INLET)
CYLINDER BLIND END
CYLINDER ROD END
TO HYDRAULIC TANK
RELIEF SETTING 2500 psi (MAX)
5/16" TRAVEL
1/2", 3/4" or 1" NPT
3/8"ø
TO REAR VALVE
FROM DIVERTER (INLET)
CYLINDER ROD ENDS
CYLINDER BLIND ENDS
EXISTING HYD. CIRCUIT
HOSE SUPPLIED BY INSTALLER
HYDRAULIC TANK
HYD. CYL. HOSES
REAR CYLINDERS
FRONT CYLINDERS
REV DATE DESCRIPTION BY APP
TITLE: VALVE ASSEMBLIES & HYDRAULIC SCHEMATIC
DIVERSIFIED METAL FABRICATORS,INC.(404)875-1512
DRAWN BY: KLC
APPD BY:
DATE: 10/07/98
DRAWING NUMBER: FT1425
REV: #

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3.0 FRONT RAILGEAR INSTALLATION

3.1 Front Railgear

NOTE:
The Railroader unit that we have shipped to you has been designed for your specific truck. However, before starting the front Railroader installation, check the vehicle's front tire spacing. The front rail gear operates between the front steering tires; therefore, you must have a minimum of 65" between the tires. If this is not the case, contact DMF.

With the front Railroader under the truck frame, Spacer thickness can be determined. Spacers may be required to place the front rail gear at the proper height. Measure the ground clearance of the front spring just in front of the front axle beam ("A", as shown in Figure 3-1). The correct distance from the ground to the center of the Rear Mounting Pin (with the front truck tires on the ground) should be 11-3/4". In order to obtain this 11-3/4" distance, 1" Spacers should be used between the spring and the Spring Bracket. Spacer distance is dependent on the Spring Hanger Bracket supplied (Nominal 4" or 6", c/top dimension 2-7/8 or 5-1/2).

To determine which Spring Hanger Bracket is supplied, measure the distance from the Rear Mounting Pin center to the top of the Spring Hanger Bracket as shown in Figure 3-1. (For Spring Hanger Brackets other than the 4" or 6", please call DMF.) See the following table to determine the number of Spacers. The number of Spacers shown in this table does not include the top Spacer that is used above the truck springs. The top Spacer has no effect on the height of the rail gear and is only used for clamping purposes.

Table A - Spacers Required

RW-1420	w/ 4" Spring Hanger Bracket (2-7/8" c/top)		w/ 6" Spring Hanger Bracket (5-1/2 c/top)	
"A" Distance	Spacer ["A" - 14-5/8"]	# of Spacers	Spacer ["A" – 17-1/4"]	# of Spacers
14-5/8 to 15-1/8"	0 to 1/2	0	Use 4" Spring Hanger Bracket	NA
15-1/4 to 16-1/8	5/8 to 1-1/2	1	Use 4" Spring Hanger Bracket	NA
16-1/4 to 17-1/8	1-5/8 to 2-1/2	2	0	0
17-1/4 to 18-1/8	2-5/8 to 3-1/2	3	0 to 7/8"	0
18-1/4 to 19-1/8	Use 6" Spring Hanger Bracket	NA	1" to 1-7/8	1

Figure 3-1

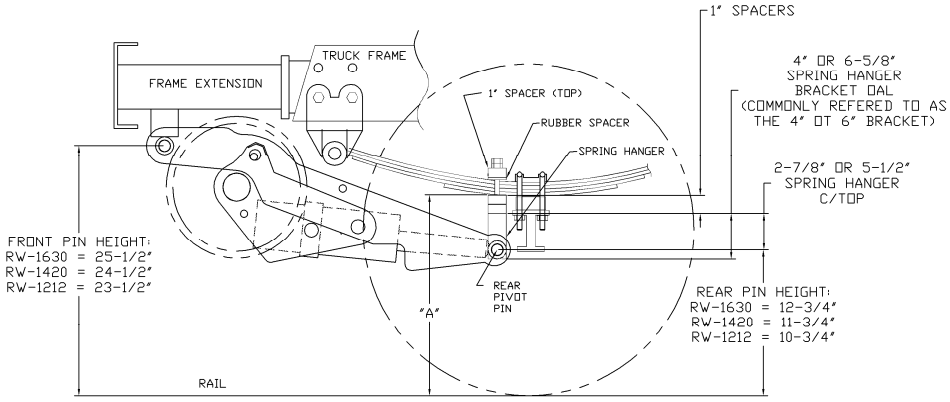

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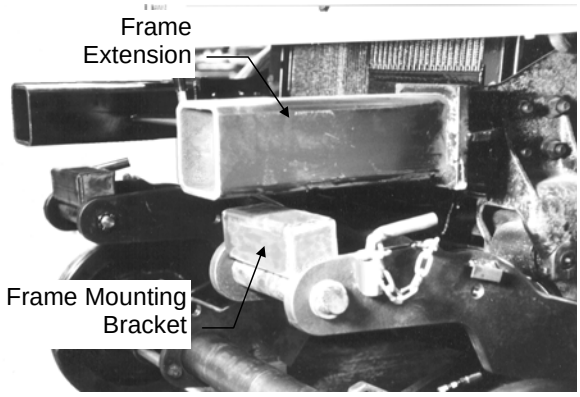
Figure 3-2



If they are required per Table A, the 1” x 2” flat bar Spacers are placed between the Spring Bracket and the underside of the truck spring. (Use the 8’ bar to lever the Long Arms and Spring Brackets up to the springs as in Figure 2-1). After lifting the Long Arms, attach each Spring Bracket to the truck spring using a Rubber Spacer directly above the spring, a 1" x 2" flat bar Spacer on top of the Rubber Spacer and two 3/4"-10 hex nuts per stud. Push the Spring Brackets back against the axle beam and tighten the hex nuts (two per stud) onto the top Spacer to cage the springs. The nuts should be tightened down until the Rubber Spacer begins to deform from the downward pressure (squeezes out between the top Spacer and spring). Remove the Front Pin-Offs and set the steering tires straight ahead. The front Railgear can now be actuated with the hydraulic system which will cause the Long Arms to be raised up to the Frame Extension (see Figure 3-2).

The Cross Tube Mounting Bracket only needs to be brought up to where it touches the Frame Extension or truck frame (not raised all the way to lift the truck frame and raise the truck tires). In order to install the front of the front Rail Gear at the correct height, the center of the Front Mounting Pins must be located at 24-1/2” from the ground (with the truck tires on the ground) as shown in Figure 3-1.

If required, shim the Cross Tube Mounting Bracket to obtain this 24-1/2”. Any shims used should be load bearing members (no thin wall tubing). If necessary, a different Frame Mounting Bracket can be used to obtain the desired height of the Front Mounting Pin.

Check for truck frame, spring, steering gear or other truck component interference with the Railroader equipment (particularly the Long Arms - see CLEARANCE NOTE in this section). Front Mounting Pin ground clearance may be reduced to as low as 22" to provide for proper fit.

NOTE:
If the vehicle is supplied with an integral extended front frame (or a set-back front axle), the Frame Extension will not be required. The Frame Mounting Bracket can be brought up to the extended frame as shown in Figure 3-3. Follow all instructions for finding the Front Mounting Pin height with the Frame Extensions. Solid or load bearing Spacers may be required between the bracket & the bottom of the frame to obtain the desired 24-1/2” from ground to Front Mounting Pin.

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Figure 3-3

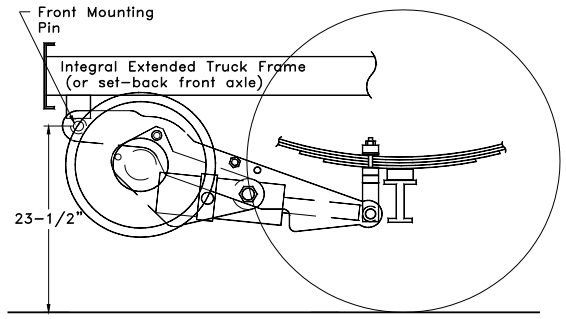
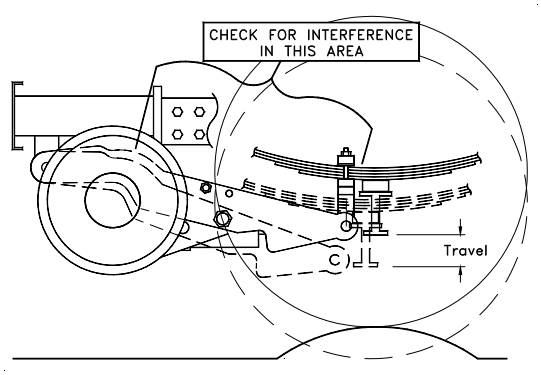


Figure 3-4



CLEARANCE NOTE:

Proper clearances will allow the rail gear to move up and down with the truck front suspension. As the truck tire hits bumps in the road, the truck spring allows the front axle to move upward (see Figure 3-4). Since the rail gear is attached to the spring just in front of the axle, sufficient clearance must be allowed to prevent interference with other parts on the truck (i.e. frame, steering boxes, shocks, oil filters, spring hangers, hydraulic lines, etc.). The Front Mounting Pin does not move in relation to the vehicle frame because it is fastened through the Frame Extension (or directly to the truck frame). As the Front Mounting Pin does not move and the Rear Mounting Pin (at the axle) does, the rail gear effectively rotates about the Front Mounting Pin. Therefore, the part of the rail gear near the Rear Mounting Pin moves more than the part near the Front Mounting Pin and attention needs to be paid, to the possible clearance problems that can be caused by this movement.

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3.2 Align Front Railgear

The front Railroaders now are ready to be squared up and aligned. Three measurements need to be taken to insure that everything is aligned properly.

To align the Long Arms, check:

(1) That they are parallel with each other and the truck frame.
The outside Long Arms should be the same distance apart at the Rear Mounting Pin as they are at the Front Mounting Pin. This prevents the mechanism from binding during up/down operation of the rail gear. Also the distance from the Long Arms to the truck frame should be the same on each side.

(2) That they are the same distance forward.
Measure the distance from the Front Mounting Pin to a common point in the truck frame (i.e. a grease fitting on the Spring Hanger). If the measurements are off, square the Railroaders by loosening the nuts on one spring hanger and moving forward on the truck spring and re-tighten.

To check the Spring Bracket location, check:

(3) That the Spring Bracket to truck axle distance is same on both sides.
Measure the distance from each Spring Bracket back to the truck axle. Since the forward position of the Long Arms has been verified (Check #2), an off measurement here probably means the front truck axle is mis-aligned and needs to be corrected.

After these alignment checks and after insuring there are sufficient clearances, the Frame Mounting Brackets can be tack welded to the Frame Extensions.

NOTE:
Do not attach the welding machine ground clamp onto the Rail Wheels. This will cause arcing across the bearings inside the wheels and lead to premature bearing failure.

Raise the front Rail Wheels just above the floor, enough to slide the front Installation Rails into place under the Rail Wheels. Because the Railroader Axle assembly is not fixed to the Pivot Arms, the Rail Wheels need to be centered. To center, measure the distance from the inside of the Rail Wheel to the truck frame. If the measurements are off, slide the Rail Wheels and Axle assembly to one side (the Axle Tube will slide through the holes in the Pivot Arms).

Depending on the brake configuration used, the Axle Tube will need to be rotated in order to locate front Railroader components in the right position. The possible configurations are:

Without Brakes:
If the rail gear is not supplied with any brakes, the Steering Wheel Locks must be aligned as shown in Figure 3-5. When the front Railroaders are down (in the rail position), these Steering Wheel Locks prevent the front truck wheel from interfering with the rail gear operation.

With Cobra Hydraulic Brakes:
If the rail gear is supplied with Cobra Hydraulic Brakes (factory-installed), then they need to be rotated around so that they are oriented in the correct position (see Figure 6-4). For the rest of the Brake installation, see Section 6.3

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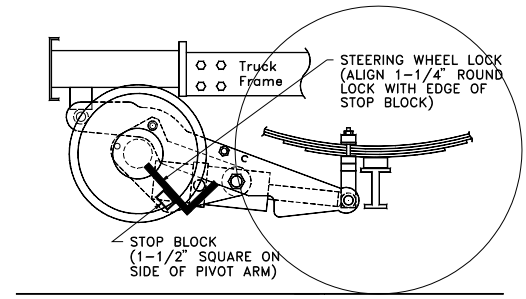
Figure 3-5



With the Axle Tubes now centered and brake configuration determined, the Axle Tubes should be tacked to each outside Pivot Arm. The inside Pivot Arms should not be welded to the Axle Tube to facilitate ease of disassembly for repair or future maintenance. Final welding is performed after alignment in Section 5.0.

The front Railroaders are ready to be lowered on the Installation Rails. As the rail gear is lowered, check the clearance from the truck tire to the Rail Wheels. (If there is interference, stop lowering the wheels, and retrace the installation steps to fix the problem.) When the Railroaders are completely lowered, the front truck tires should be approximately 2 inches above the Installation Rails. If rail gear will not lift the truck, check that the cylinders are not cross plumbed, that the system pressure relief valve (if present) is set high enough and that the pressure relief on the Front Railroader Valve is set high enough. Re-check the center alignment of the Rail Wheels to the truck frame. (If it is off, break the tacks between the outside Pivot Arms and Axle Tube and slide the Axle Tube to the correct position and re-tack in place.)

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3.3 Final Front Installation

If the Spring Bracket location had to be adjusted, make sure that the hex nuts (two per stud) on both Spring Brackets have been tightened down. Then with a torch, cut the excess stud length on the Spring Brackets. If these studs are not trimmed down, they may pose a clearance problem with other parts on the truck (see CLEARANCE NOTE and Figure 3-4 in section 3.1).

Remount the truck front bumper or use 8" std. channel welded onto the ends of the Frame Extensions.

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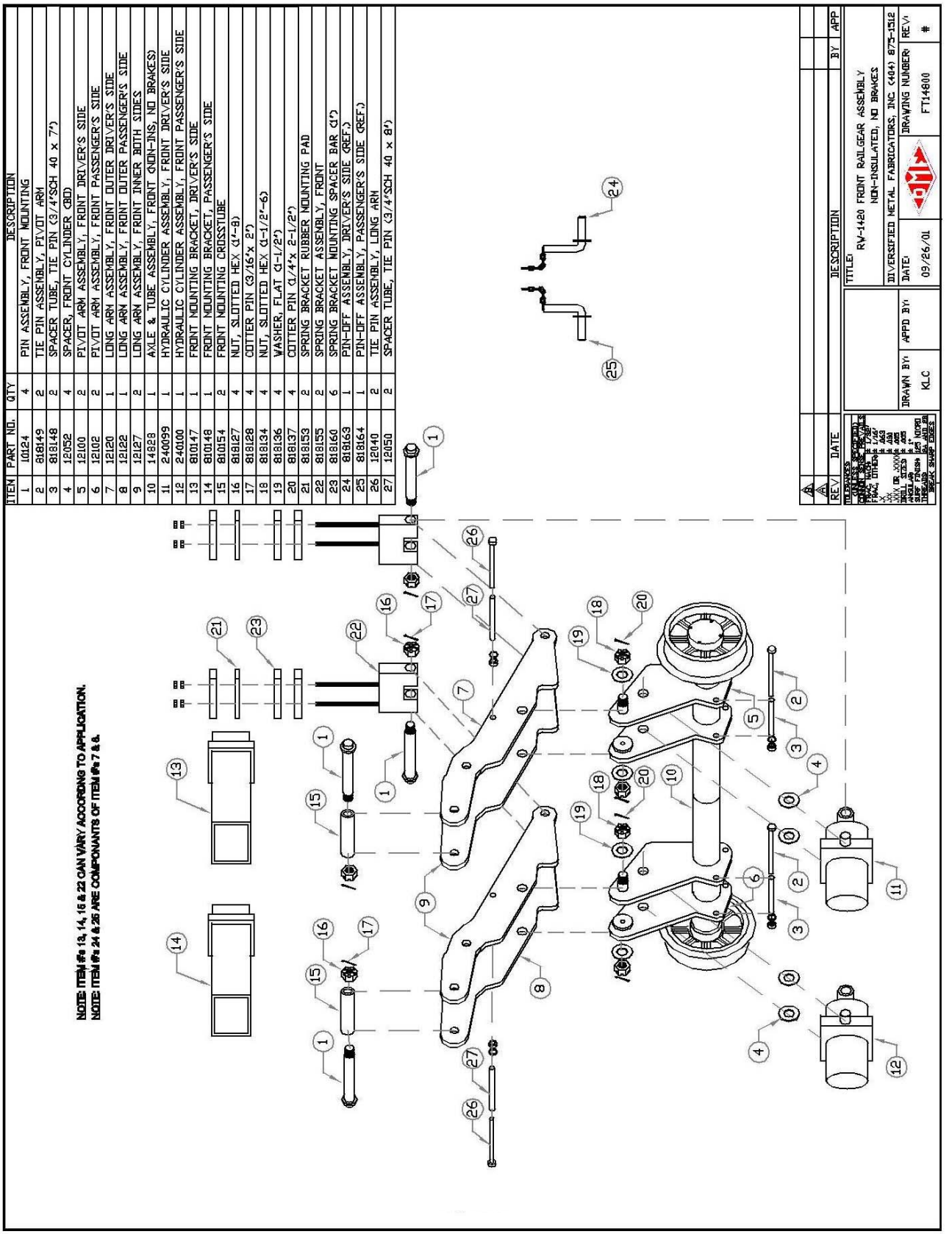
Drawing: Front Railgear Assembly


ITEM | PART NO. | QTY | DESCRIPTION
1 | 10124 | 4 | PIN ASSEMBLY, FRONT MOUNTING
2 | 818149 | 2 | TIE PIN ASSEMBLY, PIVOT ARM
3 | 818148 | 2 | SPACER TUBE, TIE PIN (3/4"SCH 40 x 7")
4 | 12052 | 4 | SPACER, FRONT CYLINDER CBD
5 | 12100 | 2 | PIVOT ARM ASSEMBLY, FRONT DRIVER'S SIDE
6 | 12102 | 2 | PIVOT ARM ASSEMBLY, FRONT PASSENGER'S SIDE
7 | 12120 | 1 | LONG ARM ASSEMBLY, FRONT OUTER DRIVER'S SIDE
8 | 12122 | 1 | LONG ARM ASSEMBLY, FRONT OUTER PASSENGER'S SIDE
9 | 12127 | 2 | LONG ARM ASSEMBLY, FRONT INNER BOTH SIDES
10 | 14828 | 1 | AXLE & TUBE ASSEMBLY, FRONT (NON-INS, NO BRAKES)
11 | 240099 | 1 | HYDRAULIC CYLINDER ASSEMBLY, FRONT DRIVER'S SIDE
12 | 240100 | 1 | HYDRAULIC CYLINDER ASSEMBLY, FRONT PASSENGER'S SIDE
13 | 810147 | 1 | FRONT MOUNTING BRACKET, DRIVER'S SIDE
14 | 810148 | 1 | FRONT MOUNTING BRACKET, PASSENGER'S SIDE
15 | 810154 | 2 | FRONT MOUNTING CROSSTUBE
16 | 818127 | 4 | NUT, SLOTTED HEX (1"-8)
17 | 818128 | 4 | COTTER PIN (3/16"x 2")
18 | 818134 | 4 | NUT, SLOTTED HEX (1-1/2"-6)
19 | 818136 | 4 | WASHER, FLAT (1-1/2")
20 | 818137 | 4 | COTTER PIN (1/4"x 2-1/2")
21 | 818153 | 2 | SPRING BRACKET RUBBER MOUNTING PAD
22 | 818155 | 2 | SPRING BRACKET ASSEMBLY, FRONT
23 | 818160 | 6 | SPRING BRACKET MOUNTING SPACER BAR (1")
24 | 818163 | 1 | PIN-OFF ASSEMBLY, DRIVER'S SIDE (REF.)
25 | 818164 | 1 | PIN-OFF ASSEMBLY, PASSENGER'S SIDE (REF.)
26 | 12040 | 2 | TIE PIN ASSEMBLY, LONG ARM
27 | 12050 | 2 | SPACER TUBE, TIE PIN (3/4"SCH 40 x 8")
NOTE: ITEM #'s 13, 14, 15 & 22 CAN VARY ACCORDING TO APPLICATION.
NOTE: ITEM #'s 24 & 25 ARE COMPONANTS OF ITEM #'s 7 & 8.
REV | DATE | DESCRIPTION | BY | APP
TITLE: RW-1420 FRONT RAILGEAR ASSEMBLY NON-INSULATED, NO BRAKES
DIVERSIFIED METAL FABRICATORS, INC (406) 873-1512
DRAWN BY: KLC
APPD BY:
DATE: 09/26/01
DRAWING NUMBER: FT14800
REV: #

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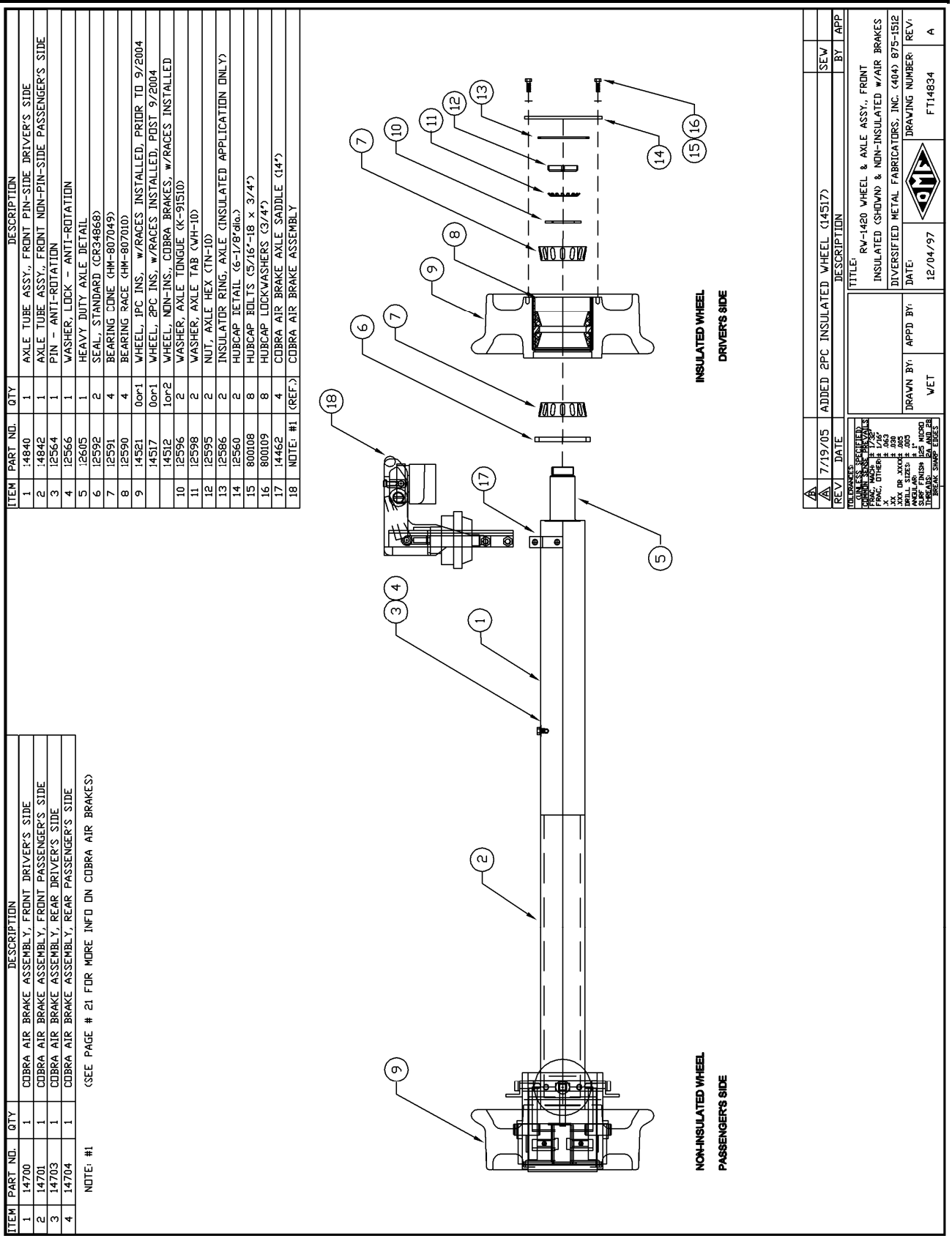
Drawing: Front Wheel & Axle Assembly I



ITEM	PART NO.	QTY	DESCRIPTION
1	14700	1	COBRA AIR BRAKE ASSEMBLY, FRONT DRIVER'S SIDE
2	14701	1	COBRA AIR BRAKE ASSEMBLY, FRONT PASSENGER'S SIDE
3	14703	1	COBRA AIR BRAKE ASSEMBLY, REAR DRIVER'S SIDE
4	14704	1	COBRA AIR BRAKE ASSEMBLY, REAR PASSENGER'S SIDE

NOTE: #1 (SEE PAGE # 21 FOR MORE INFO ON COBRA AIR BRAKES)

ITEM	PART NO.	QTY	DESCRIPTION
1	14840	1	AXLE TUBE ASSY., FRONT PIN-SIDE DRIVER'S SIDE
2	14842	1	AXLE TUBE ASSY., FRONT NON-PIN-SIDE PASSENGER'S SIDE
3	12564	1	PIN - ANTI-ROTATION
4	12566	1	WASHER, LOCK - ANTI-ROTATION
5	12605	1	HEAVY DUTY AXLE DETAIL
6	12592	2	SEAL, STANDARD (CR34868)
7	12591	4	BEARING CONE (HM-807049)
8	12590	4	BEARING RACE (HM-807010)
9	14521	0or1	WHEEL, 1PC INS, w/RACES INSTALLED, PRIOR TO 9/2004
	14517	0or1	WHEEL, 2PC INS, w/RACES INSTALLED, POST 9/2004
	14512	1or2	WHEEL, NON-INS., COBRA BRAKES, w/RACES INSTALLED
10	12596	2	WASHER, AXLE TONGUE (K-91510)
11	12598	2	WASHER, AXLE TAB (WH-10)
12	12595	2	NUT, AXLE HEX (TN-10)
13	12586	2	INSULATOR RING, AXLE (INSULATED APPLICATION ONLY)
14	12560	2	HUBCAP DETAIL (6-1/8" dia.)
15	800108	8	HUBCAP BOLTS (5/16"-18 x 3/4")
16	800109	8	HUBCAP LOCKWASHERS (3/4")
17	14462	4	COBRA AIR BRAKE AXLE SADDLE (14")
18	NOTE: #1	(REF.)	COBRA AIR BRAKE ASSEMBLY

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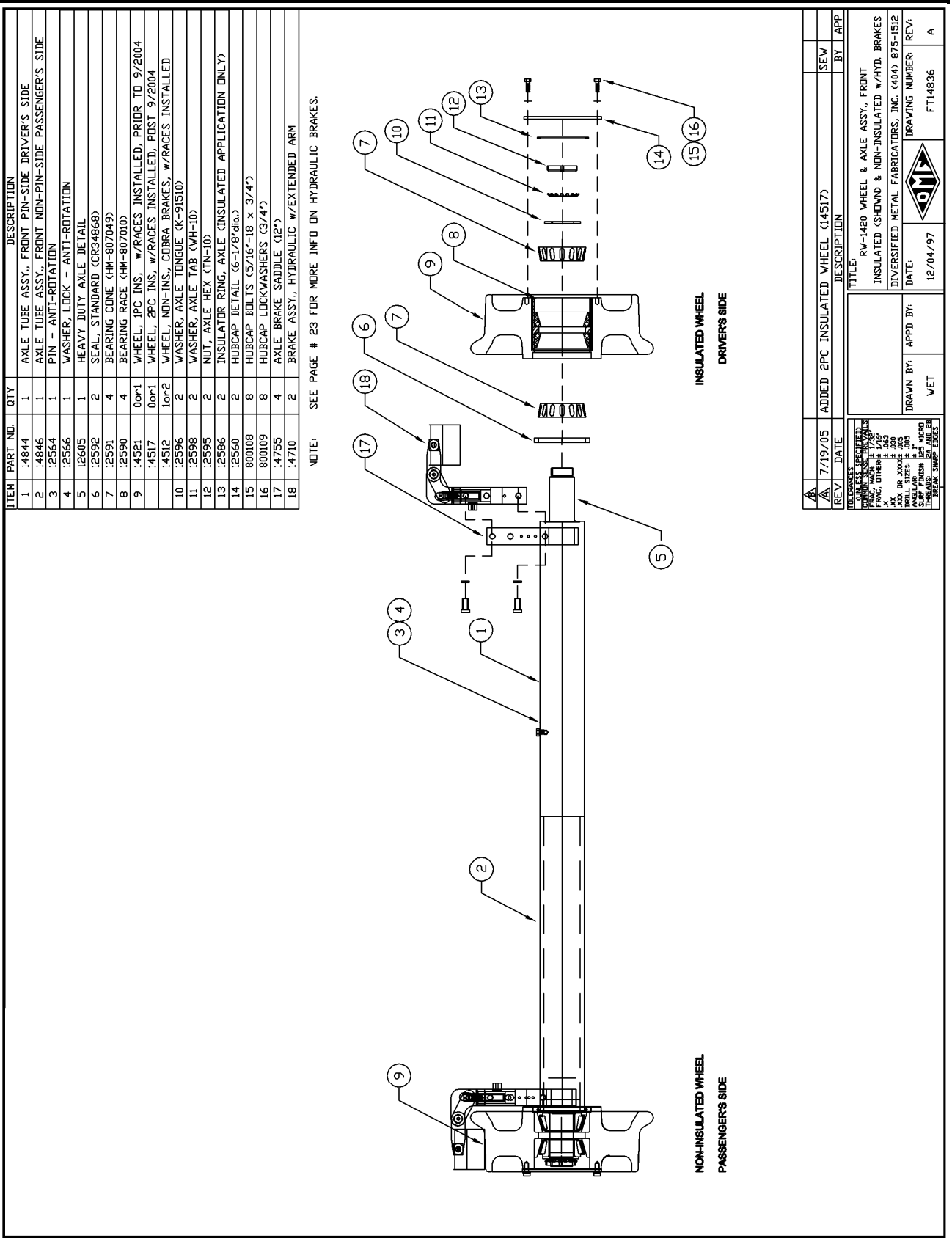
Drawing: Front Wheel & Axle Assembly II

ITEM	PART NO.	QTY	DESCRIPTION
1	14844	1	AXLE TUBE ASSY., FRONT PIN-SIDE DRIVER'S SIDE
2	14846	1	AXLE TUBE ASSY., FRONT NON-PIN-SIDE PASSENGER'S SIDE
3	12564	1	PIN - ANTI-ROTATION
4	12566	1	WASHER, LOCK - ANTI-ROTATION
5	12605	1	HEAVY DUTY AXLE DETAIL
6	12592	2	SEAL, STANDARD (CR34868)
7	12591	4	BEARING CONE (HM-807049)
8	12590	4	BEARING RACE (HM-807010)
9	14521	0or1	WHEEL, 1PC INS, w/RACES INSTALLED, PRIOR TO 9/2004
	14517	0or1	WHEEL, 2PC INS, w/RACES INSTALLED, POST 9/2004
	14512	1or2	WHEEL, NON-INS., CUBRA BRAKES, w/RACES INSTALLED
10	12596	2	WASHER, AXLE TONGUE (K-91510)
11	12598	2	WASHER, AXLE TAB (WH-10)
12	12595	2	NUT, AXLE HEX (TN-10)
13	12586	2	INSULATOR RING, AXLE (INSULATED APPLICATION ONLY)
14	12560	2	HUBCAP DETAIL (6-1/8" dia.)
15	800108	8	HUBCAP BOLTS (5/16"-18 x 3/4")
16	800109	8	HUBCAP LOCKWASHERS (3/4")
17	14755	4	AXLE BRAKE SADDLE (12")
18	14710	2	BRAKE ASSY., HYDRAULIC w/EXTENDED ARM

NOTE: SEE PAGE # 23 FOR MORE INFO ON HYDRAULIC BRAKES.



REV	DATE	DESCRIPTION	BY	APP
A	7/19/05	ADDED 2PC INSULATED WHEEL (14517)	SEW	

UNLESS SPECIFIED OTHERWISE: FRACT. ±1/64 | .X ±.063 | .XX ±.030 | .XXX ±.005 | DRILL SIZES ±.005 | ANGULAR ±1° | SURFACE FINISH 125 MICRO | THREADS 2A AND 2B | BREAK SHARP EDGES

DRAWN BY: VET | APPD BY:

TITLE: RW-1420 WHEEL & AXLE ASSY., FRONT INSULATED (SHOWN) & NON-INSULATED w/HYD. BRAKES

DIVERSIFIED METAL FABRICATORS, INC. (404) 875-1512

DATE: 12/04/97 | DRAWING NUMBER: FT14836 | REV: A

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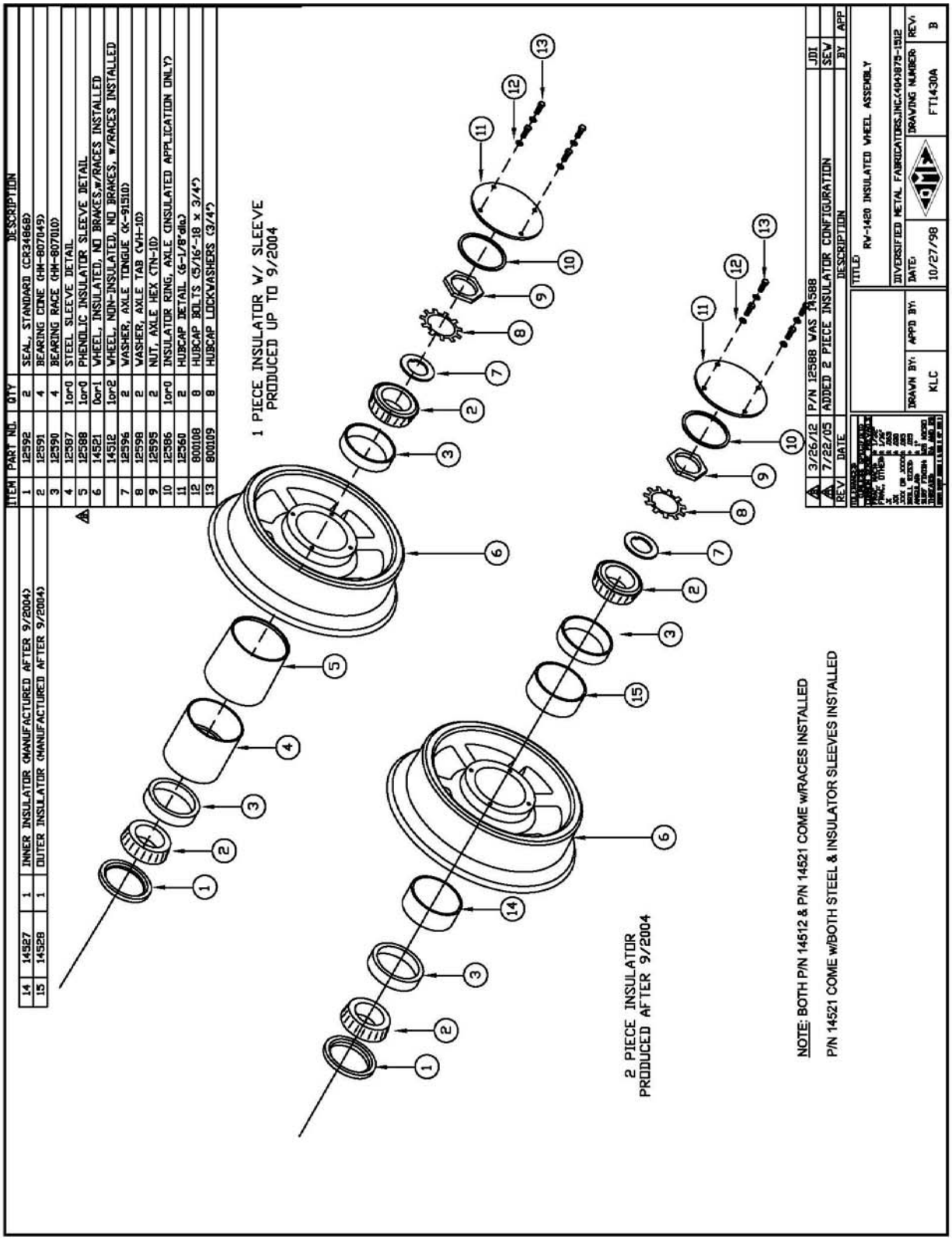
Drawing: RW-1420 Wheel – Exploded View


1 PIECE INSULATOR W/ SLEEVE
PRODUCED UP TO 9/2004
2 PIECE INSULATOR
PRODUCED AFTER 9/2004
NOTE: BOTH P/N 14512 & P/N 14521 COME w/RACES INSTALLED
P/N 14521 COME w/BOTH STEEL & INSULATOR SLEEVES INSTALLED
ITEM PART NO. QTY DESCRIPTION
14 14527 1 INNER INSULATOR (MANUFACTURED AFTER 9/2004)
15 14528 1 OUTER INSULATOR (MANUFACTURED AFTER 9/2004)
1 12592 2 SEAL, STANDARD (CR34868)
2 12591 4 BEARING CONE (HM-807049)
3 12590 4 BEARING RACE (HM-807010)
4 12587 1or0 STEEL SLEEVE DETAIL
5 12588 1or0 PHENOLIC INSULATOR SLEEVE DETAIL
6 14521 0or1 WHEEL, INSULATED, NO BRAKES,w/RACES INSTALLED
14512 1or2 WHEEL, NON-INSULATED, NO BRAKES, w/RACES INSTALLED
7 12596 2 WASHER, AXLE TONGUE (K-91510)
8 12598 2 WASHER, AXLE TAB (WH-10)
9 12595 2 NUT, AXLE HEX (TN-10)
10 12586 1or0 INSULATOR RING, AXLE (INSULATED APPLICATION ONLY)
11 12560 2 HUBCAP DETAIL (6-1/8"dia)
12 800108 8 HUBCAP BOLTS (5/16"-18 x 3/4")
13 800109 8 HUBCAP LOCKWASHERS (3/4")
REV DATE DESCRIPTION BY APP
A 7/22/05 ADDED 2 PIECE INSULATOR CONFIGURATION SEV
A 3/26/12 P/N 12588 WAS 14588 JDI
DRAWN BY: KLC
APP'D BY:
DATE: 10/27/98
DIVERSIFIED METAL FABRICATORS,INC.(404)879-1512
TITLE: RW-1420 INSULATED WHEEL ASSEMBLY
DRAWING NUMBER FT1430A
REV: B

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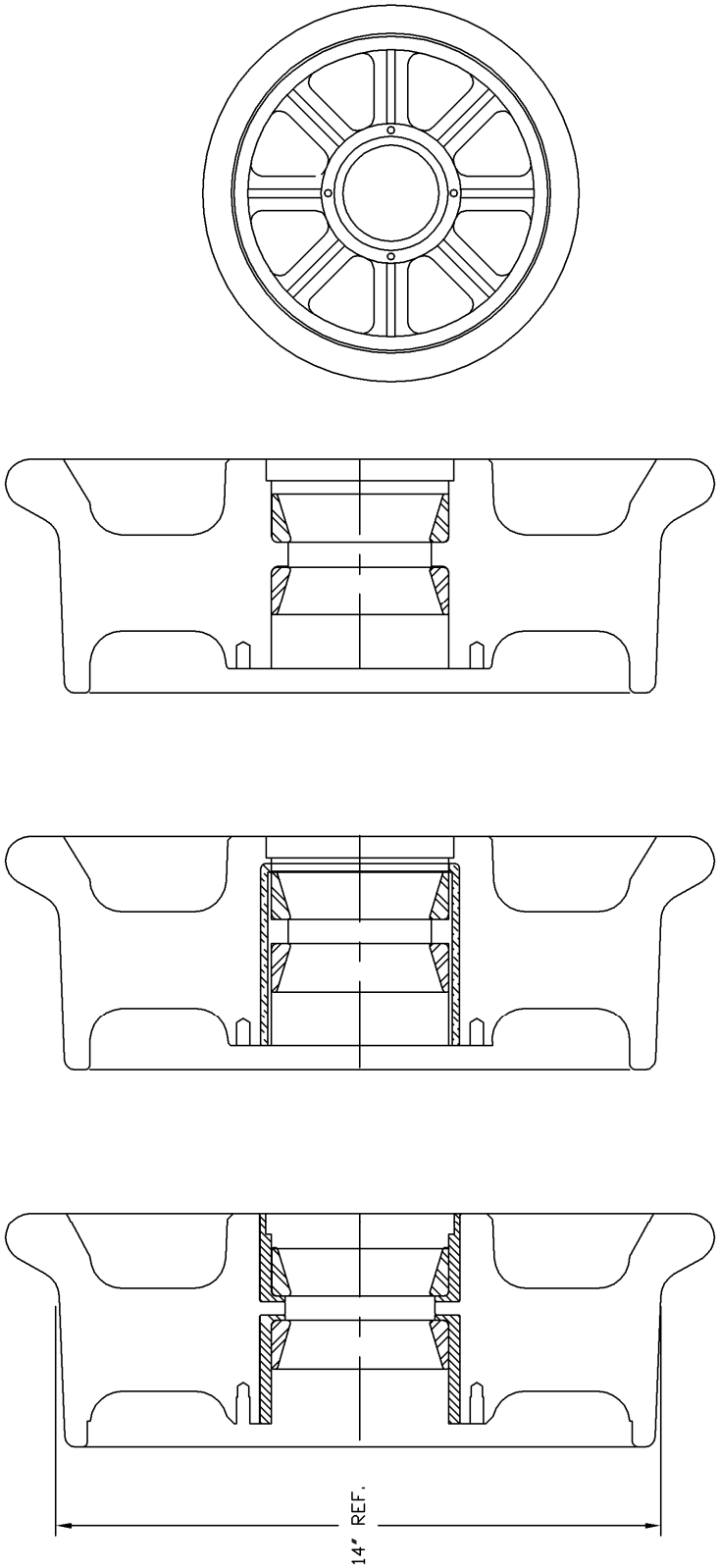
Drawing: RW-1420 Wheels – Identification Chart

ITEM	PART NO.	QTY	DESCRIPTION
1	14500	(REF.)	14" WHEEL CASTING (RW-1420)
2			



RW-1420 WHEEL - DMF P/N 14517
2PC INSULATOR w/RACES INSTALLED
PRODUCTION SINCE SEPT 2004

RW-1420 WHEEL - DMF P/N 14521
1PC INSULATED w/RACES INSTALLED
PRODUCTION UP TO SEPT. 2004

RW-1420 WHEEL - DMF P/N 14512
NON-INSULATED w/RACES INSTALLED

note: RW-1420 WHEEL - DMF P/N 14522
RE-BORED & RE-INSULATED w/RACES INSTALLED

REV	DATE	DESCRIPTION	BY	APP
A	7/19/05	ADDED 2PC INSULATED WHEEL (14517)	SEW	

UNLESS SPECIFIED
CORNER BREAK REMOVE
FRAC. ANGLES ± 1/2°
FRAC. OTHER ± 1/16"
X ± .063
.XX ± .030
.XXX OR .XXXDIA ± .005
DRILL SIZES + .015
SURF. FIN. 125 MICRO
THREADS 2A AND 2B

DRAWN BY: KLC
APPD BY:

TITLE: RW-1420 14" WHEEL IDENTIFICATION CHART

DIVERSIFIED METAL FABRICATORS,INC.(404)875-1512

DATE: 10/27/98

DRAWING NUMBER: FT1442A

REV: A

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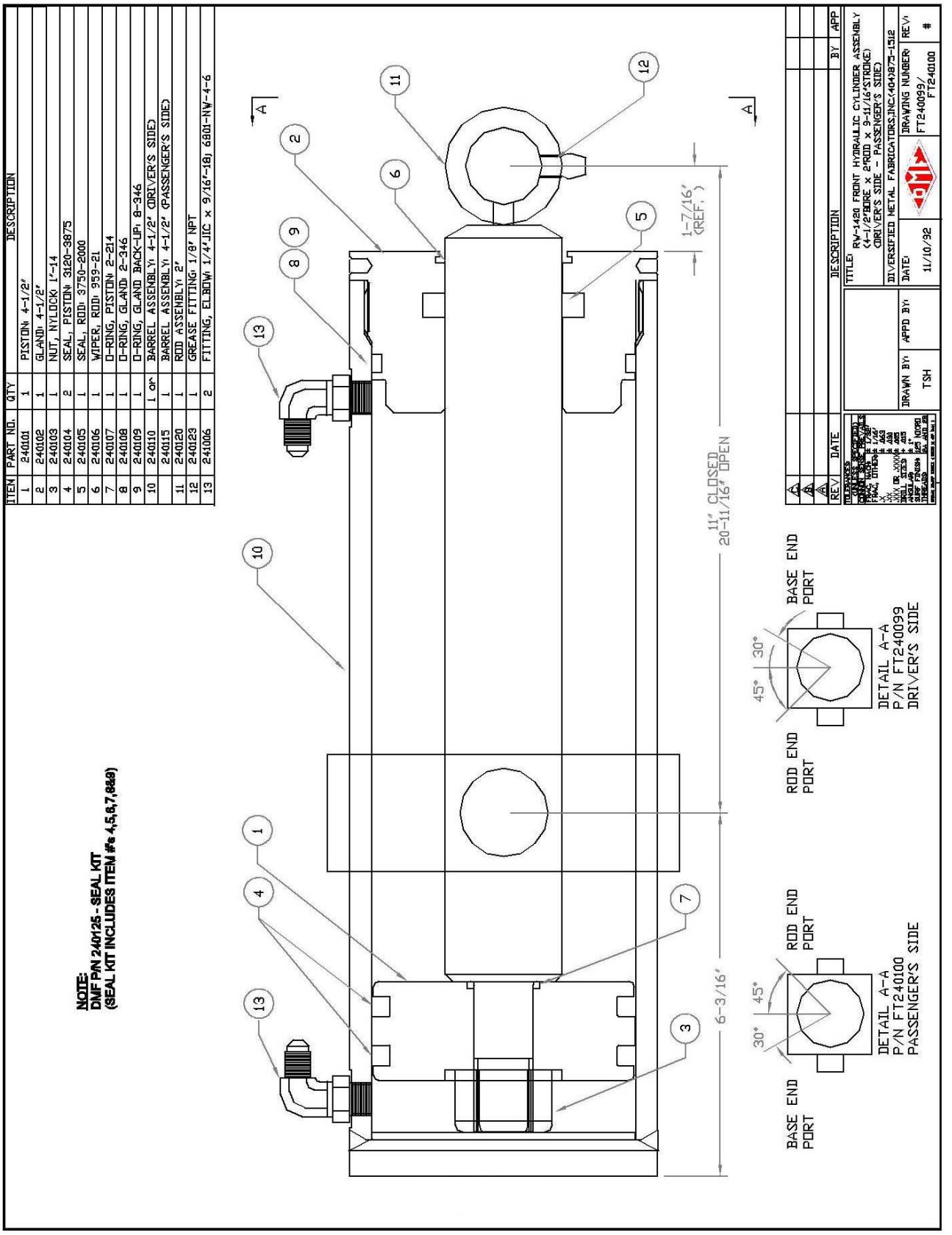
Drawing: Front Hydraulic Cylinders


ITEM | PART NO. | QTY | DESCRIPTION
1 | 240101 | 1 | PISTON, 4-1/2"
2 | 240102 | 1 | GLAND, 4-1/2"
3 | 240103 | 1 | NUT, NYLOCK 1"-14
4 | 240104 | 2 | SEAL, PISTON, 3120-3875
5 | 240105 | 1 | SEAL, ROD, 3750-2000
6 | 240106 | 1 | WIPER, ROD, 959-21
7 | 240107 | 1 | O-RING, PISTON, 2-214
8 | 240108 | 1 | O-RING, GLAND, 2-346
9 | 240109 | 1 | O-RING, GLAND BACK-UP, 8-346
10 | 240110 | 1 or | BARREL ASSEMBLY, 4-1/2" (DRIVER'S SIDE)
 | 240115 | 1 | BARREL ASSEMBLY, 4-1/2" (PASSENGER'S SIDE)
11 | 240120 | 1 | ROD ASSEMBLY, 2"
12 | 240123 | 1 | GREASE FITTING, 1/8" NPT
13 | 241006 | 2 | FITTING, ELBOW, 1/4"JIC x 9/16"-18, 6801-NW-4-6
NOTE:
DMF P/N 240125 - SEAL KIT
(SEAL KIT INCLUDES ITEM #'s 4,5,6,7,8&9)
A
A
11" CLOSED
20-11/16" OPEN
1-7/16"
(REF.)
6-3/16"
DETAIL A-A
P/N FT240099
DRIVER'S SIDE
ROD END
PORT
BASE END
PORT
45°
30°
DETAIL A-A
P/N FT240100
PASSENGER'S SIDE
ROD END
PORT
BASE END
PORT
45°
30°
REV | DATE | DESCRIPTION | BY | APP
DRAWN BY: TSH
APPD BY:
DATE: 11/10/92
TITLE: RW-1420 FRONT HYDRAULIC CYLINDER ASSEMBLY (4-1/2"BORE x 2"ROD x 9-11/16"STROKE) (DRIVER'S SIDE - PASSENGER'S SIDE)
DIVERSIFIED METAL FABRICATORS,INC.(404)875-1512
DRAWING NUMBER: FT240099/ FT240100
REV: #

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4.0 REAR RAILGEAR INSTALLATION

4.1 Location of Rear Railgear

NOTE:
It is important that the truck tire pressure (especially the rear tires) be checked and brought to the manufacturers recommended level.

With the truck on the rear Installation Rails, position the Rear Railgear as close to the rear tires as practical (allowing clearance for mud flaps). The following table gives standard location and clearance guidelines for the rear rail gear and these dimensions are shown in Figure 4-1. Generally, leave a minimum of 2" clearance to any tire, spring, or suspension components.

Minimum Distance from:	Single Axle	Tandem Axle
Tire to Rail Wheel Center	13-1/4"	9-1/4"
Min. Truck Frame Extension (from tire)	19-1/4"	15-1/4"
Overall Rail Gear Clearance (from tire)	20-1/4" x 19"	16-1/4" x 19"

If the truck frame does not extend the minimum of 19-1/4" for single axle or 15-1/4" for tandem axle trucks, it should be properly lengthened to provide the necessary mounting clearance for the rail gear.

In addition, because the rail gear typically drops straight down, but it can also articulate from side- to-side to allow alignment of the vehicle with the rail, a clear space of 19 inches must extend outward from each side of the frame in this area to allow for proper articulation (see Figure 4-1). It is important that nothing encroach upon this space (i.e. outriggers, lift-gates, body tie-down bolts).

Figure 4-1

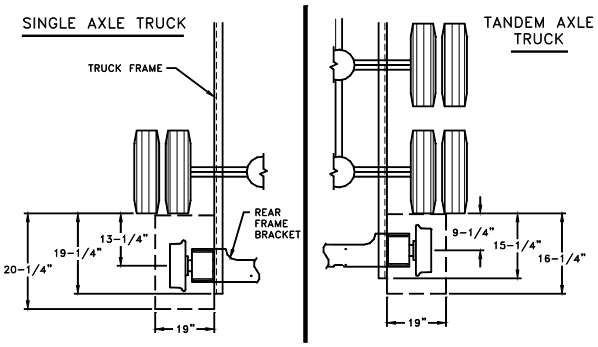

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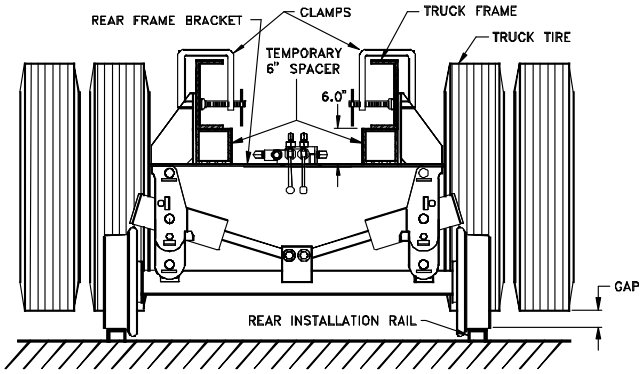
Figure 4-2



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4.2 Spacer Installation

Before proceeding, place a temporary 6"x 6"x 3/8" wall steel tube spacer between the truck frame and Rear Mounting Bracket (see Figure 4-2). Actuate both Rear Cylinders to raise the Rear Frame Bracket up to the truck frame.

NOTE:
With the Rear Railroader in position, temporarily secure (clamp, chain, etc..) in place to prevent any movement during the remaining installation.

Then raise the Rear Mounting Bracket (with temporary 6" spacer) and the truck frame and lift the truck wheels up off of the rear Installation Rails. Measure the Gap from the top of the rear Installation Rails to the bottom of the tire with this 6" spacer in place (as shown in Figure 4-2). The truck spring and tire deflection equals 6.0" minus the measured Gap. To calculate the required Spacer thickness, multiply the spring and tire deflection by 60%. The formula is:

Calculated Spacer thickness = (6.0" - Gap) x 60%

The following table shows the calculated Spacer thickness given a certain Gap. (This table is given as an example. Actual gaps may include fractions and the Spacer thickness will need to be calculated for that specific gap.)

NOTE:
Some customers require a minimum ½" spacer for future adjustability. Contact your customer to determine his requirements.

If Gap =	Spring & Tire Deflection (6.0" - Gap)	Calculated Spacer thickness (6.0" - Gap) x 60%
5"	1"	3/4"
4"	2"	1-1/4"
3"	3"	1-3/4"
2"	4"	2-3/8"
1"	5"	3"

Release the clamps holding the Rear Frame Bracket to the truck frame. Collapse the Rear Railroader to the folded position (which will lower the truck wheels back down on the Installation Rails). Replace the temporary 6" spacers with the permanent Calculated Spacers and tack in place onto the Rear Frame Bracket. These permanent Spacers should be solid steel pieces because they will experience the full structural load seen by the rear frame.

Extend the Rear Railroader to the rail position (which will raise the truck frame). The truck inner duals should be flat to slightly cupping the installation rails. Too much weight on these tires (truck frame too low) will cause rapid tire wear. Not enough weight (truck frame too high) will cause wheel spin and poor braking (see Fig. 4-3). If necessary, adjust the Spacer thickness to achieve the proper tire cap on the Installation Rails.

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Figure 4-3

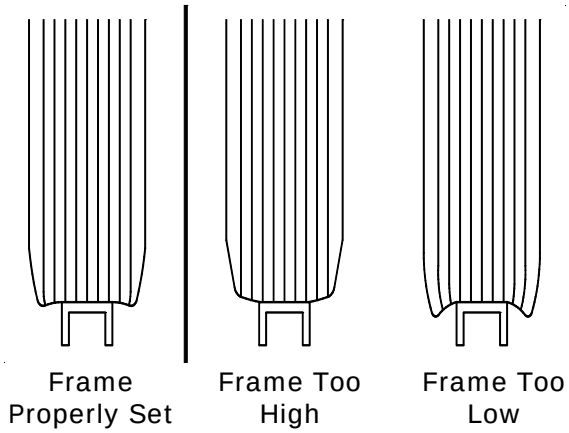
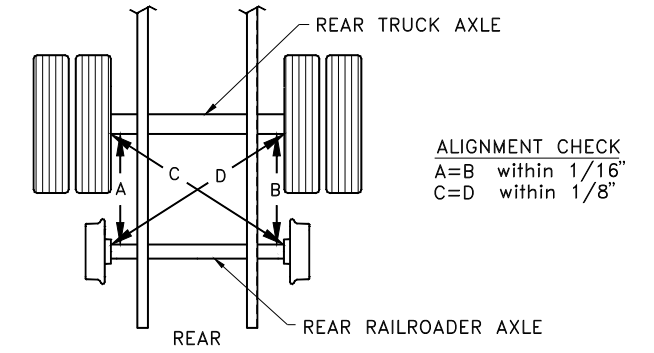


Figure 4-4



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4.3 Square Rear Railroader with Truck Axle

Once the proper height and tire-to-rail gear location has been achieved, the Rear Railroader needs to be made absolutely square with the rear truck axle. Four measurements (shown in Figure 4-4) need to be taken to insure this requirement:

(1) The distance from the truck axle to the Rear Railroader Axle at each end. In Figure 4-4, distance “A” must be equal to “B” (within 1/16”). This is an important alignment check.
(2) The diagonal from the truck axle to the opposite Rear Rail Wheel. In Figure 4-4, distance “C” must be equal to “D” (within 1/8”).

NOTE:
Although the previous mounting conditions and alignment may be met, be certain that enough room exists between the Rear Railroader and other equipment. In general, this should include a 2” clearance around the rail gear (more clearance will be needed if Remote Pin-offs are installed). Also insure that there is clearance to remove the Pin-Offs from their holes.

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4.4 Final Rear Installation

NOTE:
If more than 1/16 inch of space exists between the truck frame and the Rear Frame Bracket on each side, it will be necessary to install shim plates to center the Railroaders. These should be 12" x 12" shims of the proper thickness with equal thickness used on each side… These can be fabricated or DMF shim plates may be used.

Using the Mounting Plate as a drill template, drill four 5/8" holes through the truck frame. Locate the Mounting Plate so as to allow for maximum adjustment of the Rear Frame Bracket (see Figure 4-5). Bolt the Mounting Plate to the Rear Frame Bracket (through the shims if required) and truck frame with 5/8-11 Grade 5 bolts & nylock nuts. Tack weld the Mounting Plate to the Rear Frame Bracket. If re-adjustment is later needed, the welds may be ground off & the Rear Frame Bracket slid up or down by loosening the bolts in the slots. Also tack the Spacer into place as shown in Figure 4-6.

Figure 4-5

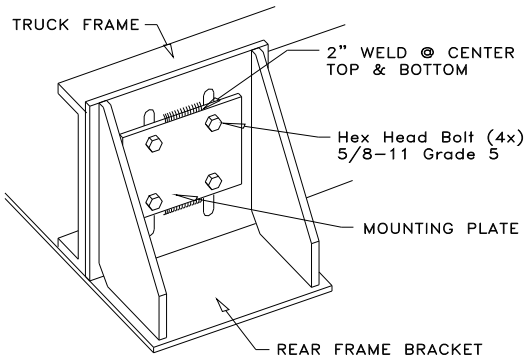
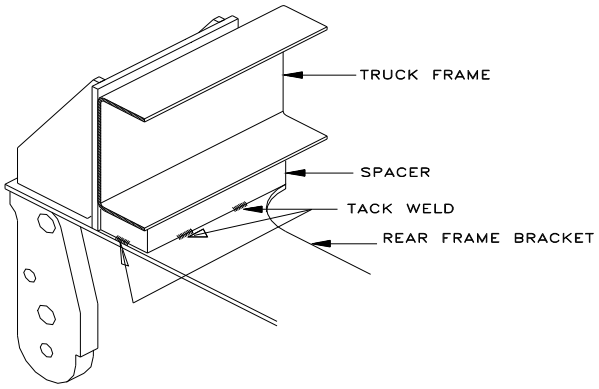


Figure 4-6



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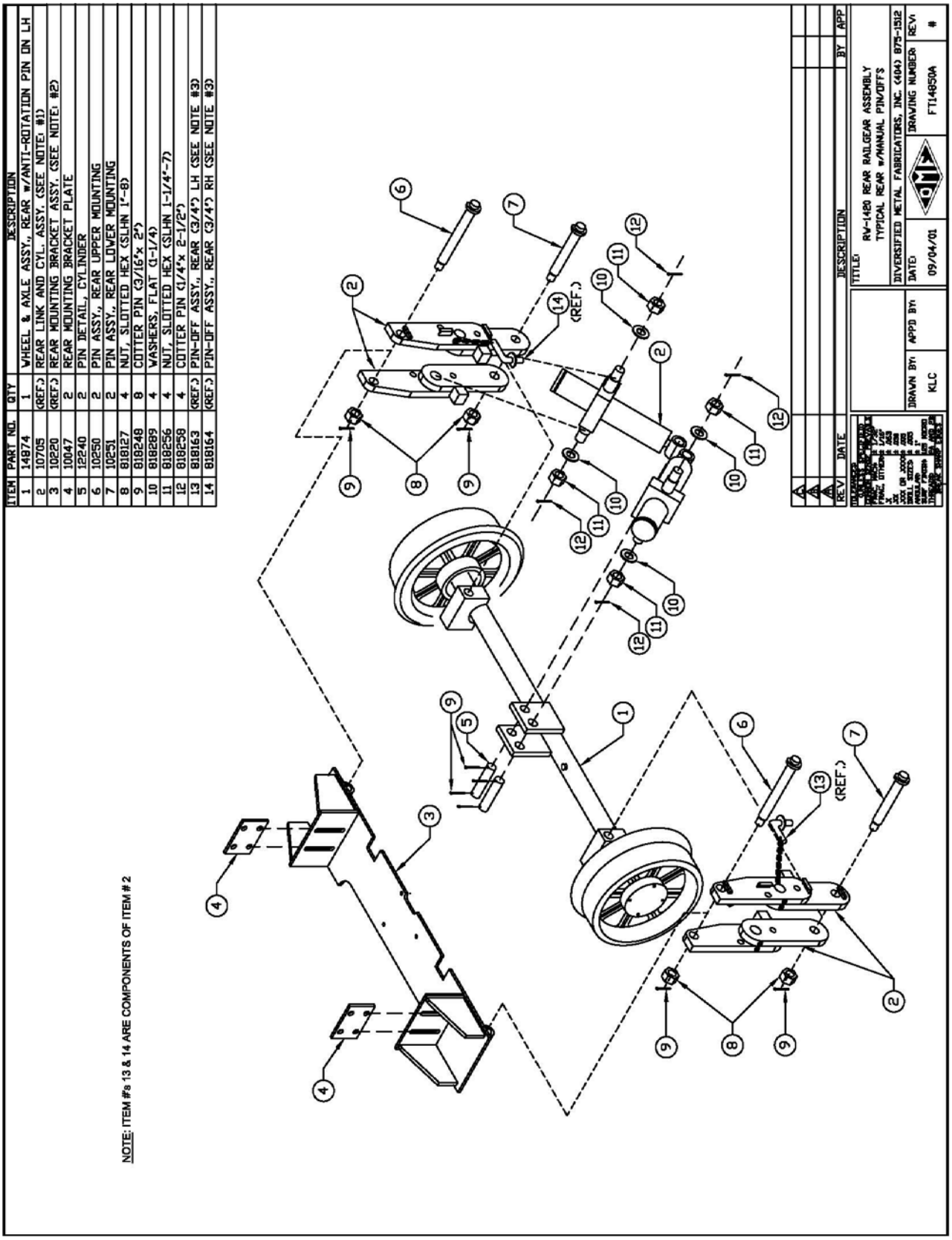
Drawing: Rear Railgear Assembly with Manual Pin-offs



ITEM	PART NO.	QTY	DESCRIPTION
1	14874	1	WHEEL & AXLE ASSY., REAR W/ANTI-ROTATION PIN ON LH
2	10705	(REF.)	REAR LINK AND CYL. ASSY. (SEE NOTE #1)
3	10220	(REF.)	REAR MOUNTING BRACKET ASSY. (SEE NOTE #2)
4	10047	2	REAR MOUNTING BRACKET PLATE
5	12240	2	PIN DETAIL, CYLINDER
6	10250	2	PIN ASSY., REAR UPPER MOUNTING
7	10251	2	PIN ASSY., REAR LOWER MOUNTING
8	818127	4	NUT, SLOTTED HEX (SLHN 1"-8)
9	818248	8	COTTER PIN (3/16"x 2")
10	818289	4	WASHERS, FLAT (1-1/4)
11	818256	4	NUT, SLOTTED HEX (SLHN 1-1/4"-7)
12	818258	4	COTTER PIN (1/4"x 2-1/2")
13	818163	(REF.)	PIN-OFF ASSY., REAR (3/4") LH (SEE NOTE #3)
14	818164	(REF.)	PIN-OFF ASSY., REAR (3/4") RH (SEE NOTE #3)

NOTE: ITEM #'s 13 & 14 ARE COMPONENTS OF ITEM # 2

REV	DATE	DESCRIPTION	BY	APP
A				

TITLE: RW-1420 REAR RAILGEAR ASSEMBLY TYPICAL REAR w/MANUAL PIN/OFFS

DIVERSIFIED METAL FABRICATORS, INC. (404) 875-1512

DRAWN BY: KLC | APPD BY: | DATE: 09/04/01 | DRAWING NUMBER: FT14850A | REV: #

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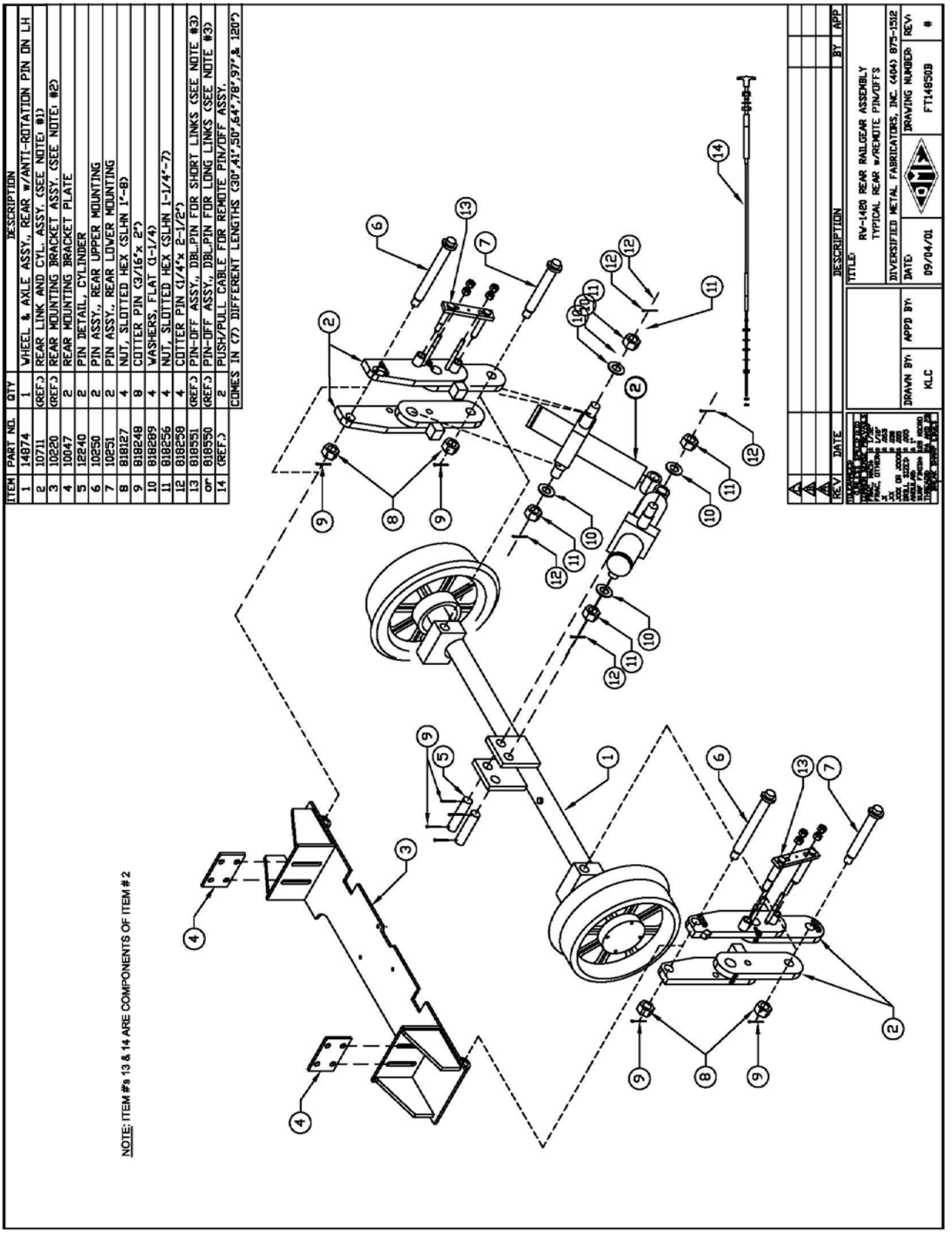
Drawing: Rear Railgear Assembly with Remote Pin-offs



ITEM	PART NO.	QTY	DESCRIPTION
1	14874	1	WHEEL & AXLE ASSY., REAR w/ANTI-ROTATION PIN ON LH
2	10711	(REF.)	REAR LINK AND CYL. ASSY. (SEE NOTE: #1)
3	10220	(REF.)	REAR MOUNTING BRACKET ASSY. (SEE NOTE: #2)
4	10047	2	REAR MOUNTING BRACKET PLATE
5	12240	2	PIN DETAIL, CYLINDER
6	10250	2	PIN ASSY., REAR UPPER MOUNTING
7	10251	2	PIN ASSY., REAR LOWER MOUNTING
8	818127	4	NUT, SLOTTED HEX (SLHN 1"-8)
9	818248	8	COTTER PIN (3/16"x 2")
10	818289	4	WASHERS, FLAT (1-1/4)
11	818256	4	NUT, SLOTTED HEX (SLHN 1-1/4"-7)
12	818258	4	COTTER PIN (1/4"x 2-1/2")
13	818551	(REF.)	PIN-OFF ASSY., DBL.PIN FOR SHORT LINKS (SEE NOTE #3)
or	818550	(REF.)	PIN-OFF ASSY., DBL.PIN FOR LONG LINKS (SEE NOTE #3)
14	(REF.)	2	PUSH/PULL CABLE FOR REMOTE PIN/OFF ASSY.
			COMES IN (7) DIFFERENT LENGTHS (30",41",50",64",78",97",& 120")

NOTE: ITEM #'s 13 & 14 ARE COMPONENTS OF ITEM # 2

REV	DATE	DESCRIPTION	BY	APP

TITLE: RW-1420 REAR RAILGEAR ASSEMBLY
TYPICAL REAR w/REMOTE PIN/OFFS

DIVERSIFIED METAL FABRICATORS, INC. (404) 875-1512

DRAWN BY: KLC | APP'D BY: | DATE: 09/04/01 | DRAWING NUMBER: FT14850B | REV: #

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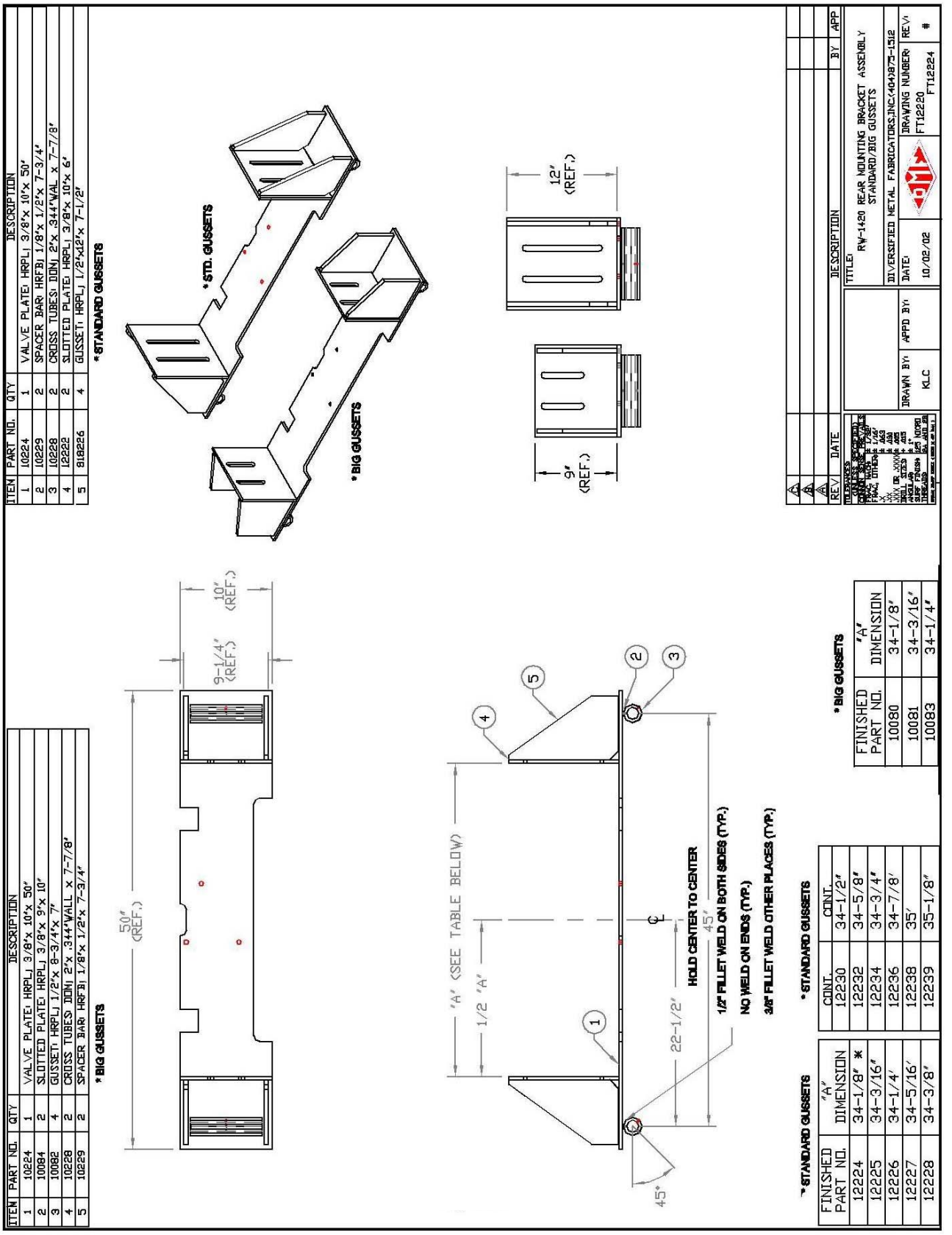
Drawing: Rear Mounting Brackets


ITEM | PART NO. | QTY | DESCRIPTION
1 | 10224 | 1 | VALVE PLATE, HRPL, 3/8"x 10"x 50"
2 | 10229 | 2 | SPACER BAR HRFB, 1/8"x 1/2"x 7-3/4"
3 | 10228 | 2 | CROSS TUBES DOM, 2"x .344"WAL x 7-7/8"
4 | 12222 | 2 | SLOTTED PLATE, HRPL, 3/8"x 10"x 6"
5 | 818226 | 4 | GUSSET, HRPL, 1/2"x12"x 7-1/2"
* STANDARD GUSSETS
* STD. GUSSETS
* BIG GUSSETS
12" (REF.)
9" (REF.)
ITEM | PART NO. | QTY | DESCRIPTION
1 | 10224 | 1 | VALVE PLATE, HRPL, 3/8"x 10"x 50"
2 | 10084 | 2 | SLOTTED PLATE, HRPL, 3/8"x 9"x 10"
3 | 10082 | 4 | GUSSET, HRPL, 1/2"x 8-3/4"x 7"
4 | 10228 | 2 | CROSS TUBES DOM, 2"x .344"WALL x 7-7/8"
5 | 10229 | 2 | SPACER BAR HRFB, 1/8"x 1/2"x 7-3/4"
* BIG GUSSETS
50" (REF.)
9-1/4" (REF.)
10" (REF.)
"A" (SEE TABLE BELOW)
1/2 "A"
22-1/2"
45°
45°
HOLD CENTER TO CENTER
1/2" FILLET WELD ON BOTH SIDES (TYP.)
NO WELD ON ENDS (TYP.)
3/8" FILLET WELD OTHER PLACES (TYP.)
* STANDARD GUSSETS
FINISHED PART NO. | "A" DIMENSION | CONT.
12224 | 34-1/8" * | 12230
12225 | 34-3/16" | 12232
12226 | 34-1/4" | 12234
12227 | 34-5/16" | 12236
12228 | 34-3/8" | 12238
12239
* STANDARD GUSSETS
CONT. | 34-1/2"
12230 | 34-5/8"
12232 | 34-3/4"
12234 | 34-7/8"
12236 | 35"
12238 | 35-1/8"
12239
* BIG GUSSETS
FINISHED PART NO. | "A" DIMENSION
10080 | 34-1/8"
10081 | 34-3/16"
10083 | 34-1/4"
REV | DATE | DESCRIPTION | BY | APP
DRAWN BY | APPD BY
KLC
TITLE: RW-1420 REAR MOUNTING BRACKET ASSEMBLY STANDARD/BIG GUSSETS
DIVERSIFIED METAL FABRICATORS,INC/404875-1512
DATE: 10/02/02
DRAWING NUMBER | REV
FT12220 FT12224 #

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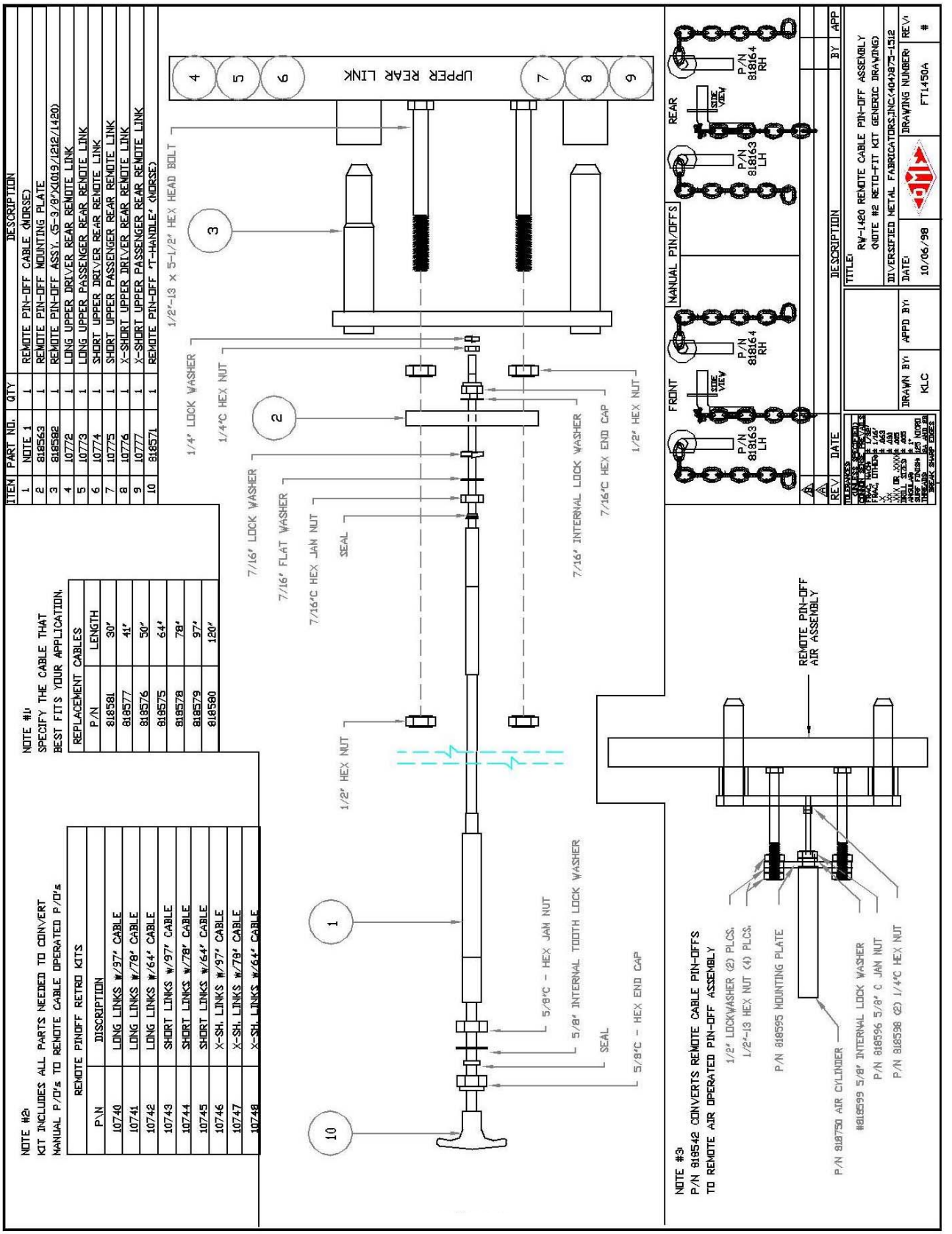
Drawing: Manual & Remote Pin-offs and Cables


ITEM | PART NO. | QTY | DESCRIPTION
1 | NOTE 1 | 1 | REMOTE PIN-OFF CABLE (MORSE)
2 | 818563 | 1 | REMOTE PIN-OFF MOUNTING PLATE
3 | 818582 | 1 | REMOTE PIN-OFF ASSY. (5-3/8"X1019/1212/1420)
4 | 10772 | 1 | LONG UPPER DRIVER REAR REMOTE LINK
5 | 10773 | 1 | LONG UPPER PASSENGER REAR REMOTE LINK
6 | 10774 | 1 | SHORT UPPER DRIVER REAR REMOTE LINK
7 | 10775 | 1 | SHORT UPPER PASSENGER REAR REMOTE LINK
8 | 10776 | 1 | X-SHORT UPPER DRIVER REAR REMOTE LINK
9 | 10777 | 1 | X-SHORT UPPER PASSENGER REAR REMOTE LINK
10 | 818571 | 1 | REMOTE PIN-OFF "T-HANDLE" (MORSE)
NOTE #1:
SPECIFY THE CABLE THAT
BEST FITS YOUR APPLICATION.
REPLACEMENT CABLES
P/N | LENGTH
818581 | 30"
818577 | 41"
818576 | 50"
818575 | 64"
818578 | 78"
818579 | 97"
818580 | 120"
NOTE #2:
KIT INCLUDES ALL PARTS NEEDED TO CONVERT
MANUAL P/D's TO REMOTE CABLE OPERATED P/D's
REMOTE PINOFF RETRO KITS
P\N | DISCRIPTION
10740 | LONG LINKS W/97" CABLE
10741 | LONG LINKS W/78" CABLE
10742 | LONG LINKS W/64" CABLE
10743 | SHORT LINKS W/97" CABLE
10744 | SHORT LINKS W/78" CABLE
10745 | SHORT LINKS W/64" CABLE
10746 | X-SH. LINKS W/97" CABLE
10747 | X-SH. LINKS W/78" CABLE
10748 | X-SH. LINKS W/64" CABLE
UPPER REAR LINK
1/2"-13 x 5-1/2" HEX HEAD BOLT
1/4" LOCK WASHER
1/4"C HEX NUT
7/16" LOCK WASHER
7/16" FLAT WASHER
7/16"C HEX JAM NUT
SEAL
1/2" HEX NUT
7/16" INTERNAL LOCK WASHER
7/16"C HEX END CAP
1/2" HEX NUT
5/8"C - HEX JAM NUT
5/8" INTERNAL TOOTH LOCK WASHER
SEAL
5/8"C - HEX END CAP
REMOTE PIN-OFF AIR ASSEMBLY
NOTE #3:
P/N 818542 CONVERTS REMOTE CABLE PIN-OFFS
TO REMOTE AIR OPERATED PIN-OFF ASSEMBLY
1/2" LOCKWASHER (2) PLCS.
1/2"-13 HEX NUT (4) PLCS.
P/N 818595 MOUNTING PLATE
P/N 818750 AIR CYLINDER
#818599 5/8" INTERNAL LOCK WASHER
P/N 818596 5/8" C JAM NUT
P/N 818598 (2) 1/4"C HEX NUT
FRONT
REAR
SIDE VIEW
P/N 818163 LH
P/N 818164 RH
MANUAL PIN/OFFS
REV | DATE | DESCRIPTION | BY | APP
TITLE:
RW-1420 REMOTE CABLE PIN-OFF ASSEMBLY
<NOTE #2 RETO-FIT KIT GENERIC DRAWING>
DIVERSIFIED METAL FABRICATORS,INC.(404)875-1512
DRAWN BY: KLC
APPD BY:
DATE: 10/06/98
DRAWING NUMBER: FT1450A
REV: #

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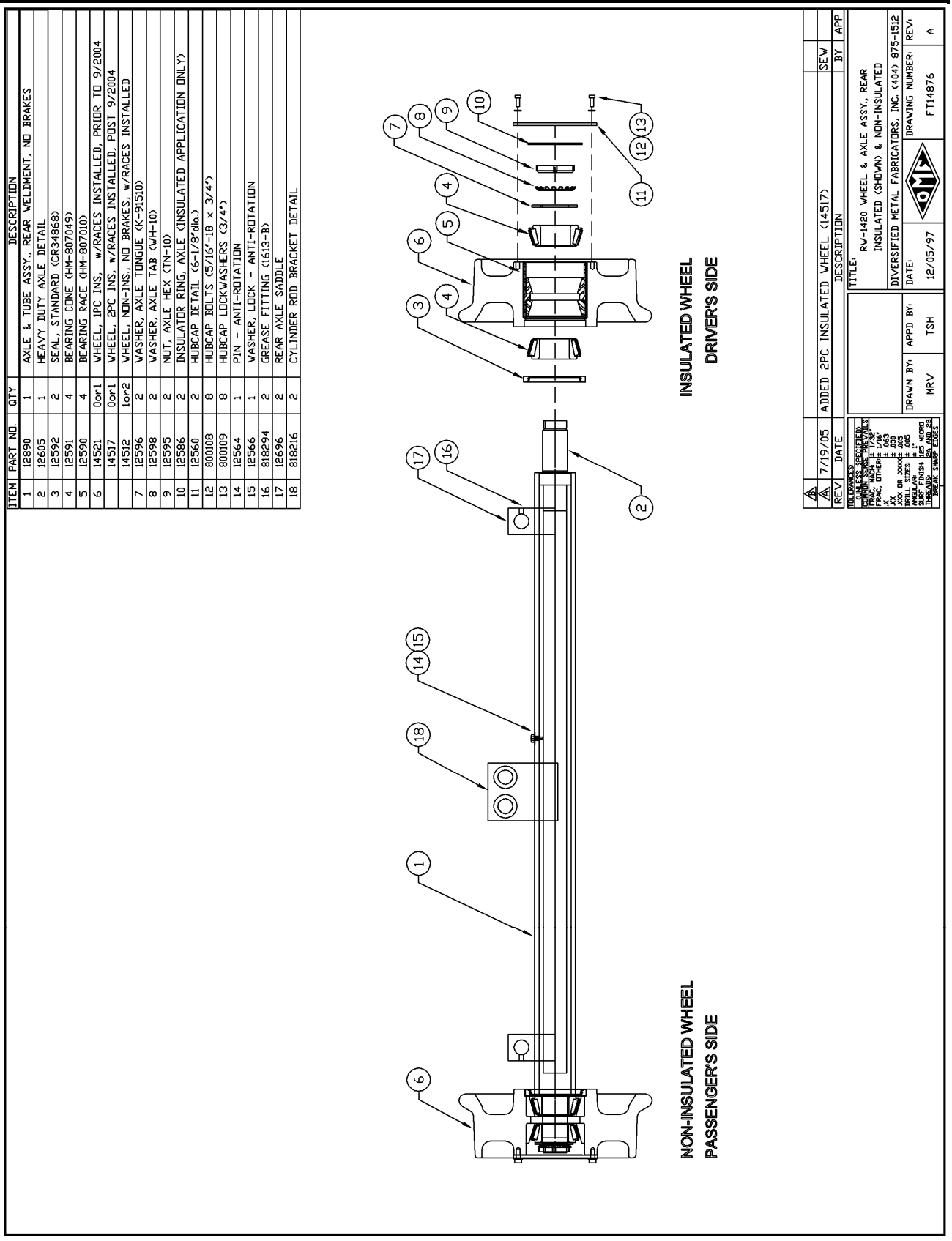
Drawing: Rear Wheel and Axle Assembly – Exploded View

ITEM	PART NO.	QTY	DESCRIPTION
1	12890	1	AXLE & TUBE ASSY., REAR WELDMENT, NO BRAKES
2	12605	1	HEAVY DUTY AXLE DETAIL
3	12592	2	SEAL, STANDARD (CR34868)
4	12591	4	BEARING CONE (HM-807049)
5	12590	4	BEARING RACE (HM-807010)
6	14521	0or1	WHEEL, 1PC INS, w/RACES INSTALLED, PRIOR TO 9/2004
	14517	0or1	WHEEL, 2PC INS. w/RACES INSTALLED, POST 9/2004
	14512	1or2	WHEEL, NON-INS., NO BRAKES, w/RACES INSTALLED
7	12596	2	WASHER, AXLE TONGUE (K-91510)
8	12598	2	WASHER, AXLE TAB (WH-10)
9	12595	2	NUT, AXLE HEX (TN-10)
10	12586	2	INSULATOR RING, AXLE (INSULATED APPLICATION ONLY)
11	12560	2	HUBCAP DETAIL (6-1/8"dia.)
12	800108	8	HUBCAP BOLTS (5/16"-18 x 3/4")
13	800109	8	HUBCAP LOCKWASHERS (3/4")
14	12564	1	PIN - ANTI-ROTATION
15	12566	1	WASHER, LOCK - ANTI-ROTATION
16	818294	2	GREASE FITTING (1613-B)
17	12696	2	REAR AXLE SADDLE
18	818216	2	CYLINDER ROD BRACKET DETAIL



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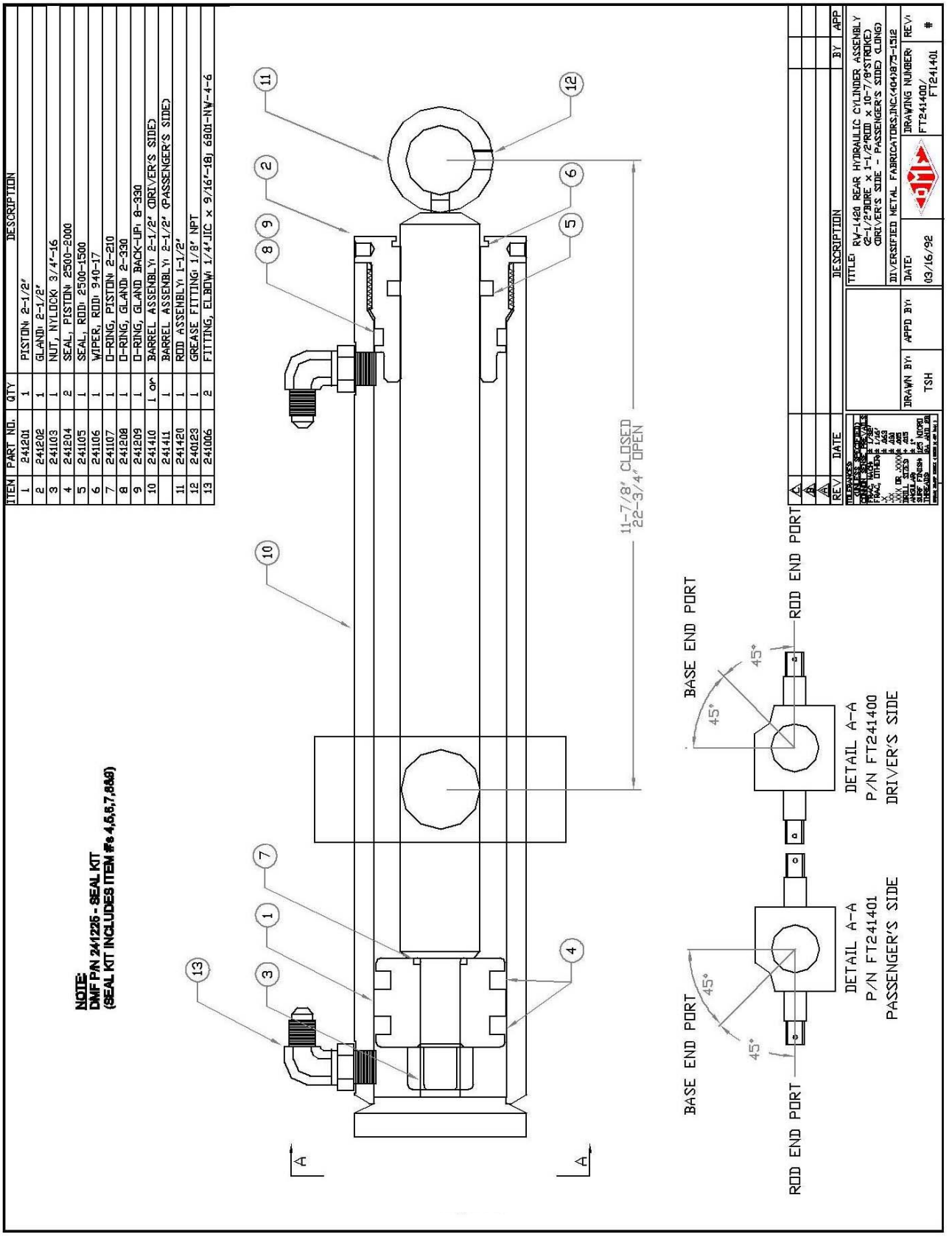
Drawing: Rear Hydraulic Cylinders I


ITEM | PART NO. | QTY | DESCRIPTION
1 | 241201 | 1 | PISTON, 2-1/2"
2 | 241202 | 1 | GLAND, 2-1/2"
3 | 241103 | 1 | NUT, NYLOCK 3/4"-16
4 | 241204 | 2 | SEAL, PISTON, 2500-2000
5 | 241105 | 1 | SEAL, ROD, 2500-1500
6 | 241106 | 1 | WIPER, ROD, 940-17
7 | 241107 | 1 | O-RING, PISTON, 2-210
8 | 241208 | 1 | O-RING, GLAND, 2-330
9 | 241209 | 1 | O-RING, GLAND BACK-UP, 8-330
10 | 241410 | 1 OR | BARREL ASSEMBLY, 2-1/2" (DRIVER'S SIDE)
 | 241411 | 1 | BARREL ASSEMBLY, 2-1/2" (PASSENGER'S SIDE)
11 | 241420 | 1 | ROD ASSEMBLY, 1-1/2"
12 | 240123 | 1 | GREASE FITTING, 1/8" NPT
13 | 241006 | 2 | FITTING, ELBOW, 1/4" JIC x 9/16"-18, 6801-NW-4-6
NOTE:
DMF P/N 241226 - SEAL KIT
(SEAL KIT INCLUDES ITEM #s 4,5,6,7,8&9)
11-7/8" CLOSED
22-3/4" OPEN
A
A
BASE END PORT
ROD END PORT
45°
45°
DETAIL A-A
P/N FT241400
DRIVER'S SIDE
BASE END PORT
ROD END PORT
45°
45°
DETAIL A-A
P/N FT241401
PASSENGER'S SIDE
REV | DATE | DESCRIPTION | BY | APP
TITLE: RW-1420 REAR HYDRAULIC CYLINDER ASSEMBLY (2-1/2"BORE x 1-1/2"ROD x 10-7/8"STROKE) (DRIVER'S SIDE - PASSENGER'S SIDE CLING)
DIVERSIFIED METAL FABRICATORS,INC.(404)875-1512
DRAWN BY: TSH
APPD BY:
DATE: 03/16/92
DRAWING NUMBER: FT241400/ FT241401
REV: #

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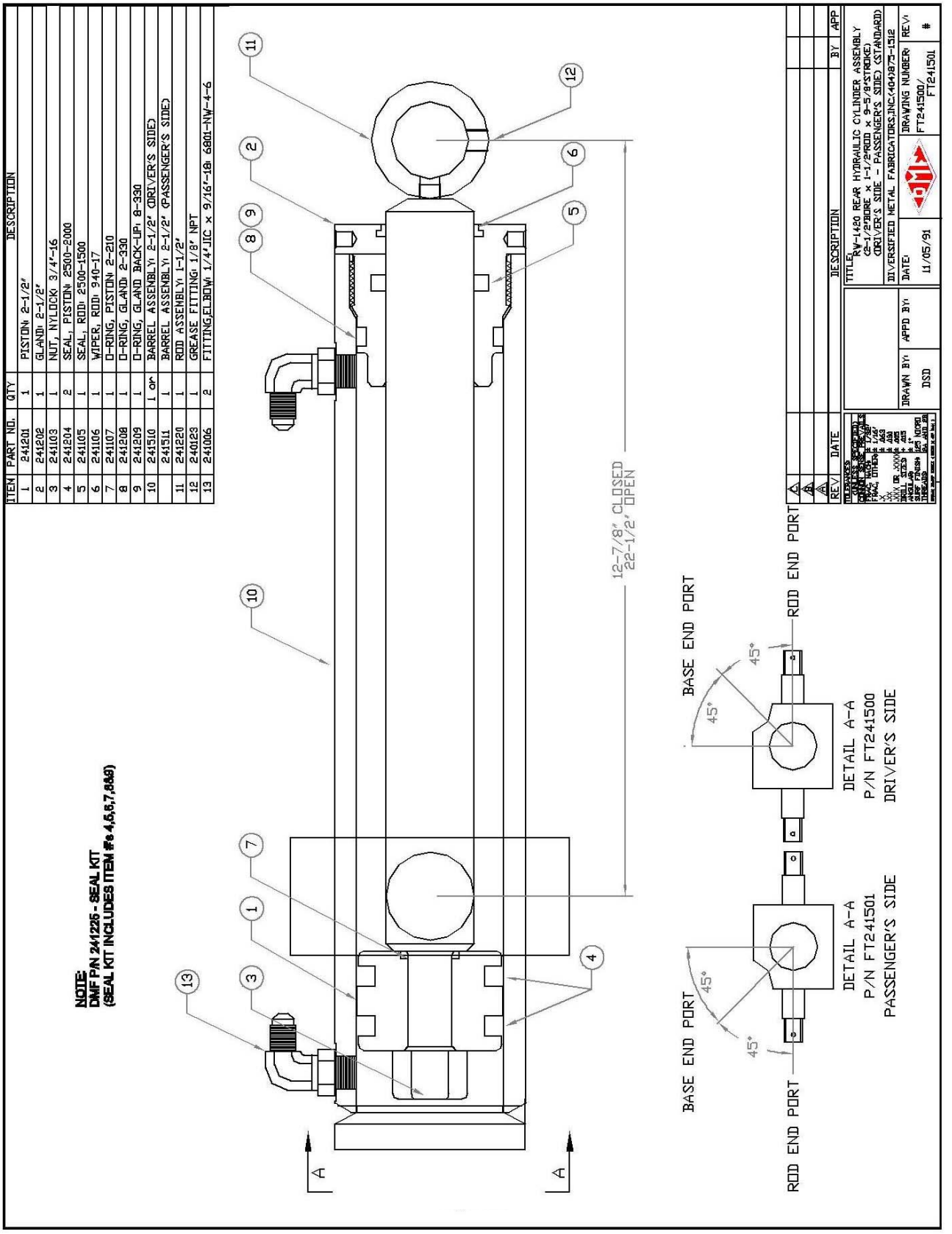
Drawing: Rear Hydraulic Cylinders II


ITEM | PART NO. | QTY | DESCRIPTION
1 | 241201 | 1 | PISTON, 2-1/2"
2 | 241202 | 1 | GLAND, 2-1/2"
3 | 241103 | 1 | NUT, NYLOCK 3/4"-16
4 | 241204 | 2 | SEAL, PISTON, 2500-2000
5 | 241105 | 1 | SEAL, ROD, 2500-1500
6 | 241106 | 1 | WIPER, ROD, 940-17
7 | 241107 | 1 | O-RING, PISTON, 2-210
8 | 241208 | 1 | O-RING, GLAND, 2-330
9 | 241209 | 1 | O-RING, GLAND BACK-UP, 8-330
10 | 241510 | 1 OR | BARREL ASSEMBLY, 2-1/2" (DRIVER'S SIDE)
 | 241511 | 1 | BARREL ASSEMBLY, 2-1/2" (PASSENGER'S SIDE)
11 | 241220 | 1 | ROD ASSEMBLY, 1-1/2"
12 | 240123 | 1 | GREASE FITTING, 1/8" NPT
13 | 241006 | 2 | FITTING,ELBOW, 1/4"JIC x 9/16"-18, 6801-NW-4-6
NOTE
DMF P/N 241226 - SEAL KIT
(SEAL KIT INCLUDES ITEM #s 4,5,6,7,8&9)
12-7/8" CLOSED
22-1/2" OPEN
BASE END PORT
ROD END PORT
45°
DETAIL A-A
P/N FT241500
DRIVER'S SIDE
DETAIL A-A
P/N FT241501
PASSENGER'S SIDE
REV | DATE | DESCRIPTION | BY | APP
TITLE: RW-1420 REAR HYDRAULIC CYLINDER ASSEMBLY (2-1/2"BORE x 1-1/2"ROD x 9-5/8"STROKE) (DRIVER'S SIDE - PASSENGER'S SIDE) (STANDARD)
DIVERSIFIED METAL FABRICATORS,INC.(404)875-1512
DRAWN BY: DSD
APPD BY:
DATE: 11/05/91
DRAWING NUMBER: FT241500/ FT241501
REV: #

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4.5 Rear Link Variations

Manual Pin-off with Standard Lower Links

Link Kit	Position	P/N	(BO)
Short Links	Upper Front Passenger	10765	10234
10717	Upper Front Driver	10764	"
	Upper Rear Passenger	10767	"
	Upper Rear Driver	10766	"
	Lower Front Passenger	10233	10233
	Lower Front Driver	10233	"
	Lower Rear Passenger	10783	"
	Lower Rear Driver	10782	"
Link Kit	**Position**	**P/N**	**(BO)**
Long Links	Upper Front Passenger	10761	10231
10715	Upper Front Driver	10760	"
	Upper Rear Passenger	10763	"
	Upper Rear Driver	10762	"
	Lower Front Passenger	10230	10230
	Lower Front Driver	10230	"
	Lower Rear Passenger	10781	"
	Lower Rear Driver	10780	"
Link Kit	**Position**	**P/N**	**(BO)**
X-Short Links	Upper Front Passenger	10769	10236
10719	Upper Front Driver	10768	"
	Upper Rear Passenger	10771	"
	Upper Rear Driver	10770	"
	Lower Front Passenger	10235	10235
	Lower Front Driver	10235	"
	Lower Rear Passenger	10785	"
	Lower Rear Driver	10784	"

Manual Pin-off with Slotted Lower Links

Link Kit	Position	P/N	(BO)
Short Links	Upper Front Passenger	10765	10234
10718	Upper Front Driver	10764	"
	Upper Rear Passenger	10767	"
	Upper Rear Driver	10766	"
	Lower	10245	10233
Link Kit	**Position**	**P/N**	**(BO)**
Long Links	Upper Front Passenger	10761	10231
10716	Upper Front Driver	10760	"
	Upper Rear Passenger	10763	"
	Upper Rear Driver	10762	"
	Lower	10243	10230
Link Kit	**Position**	**P/N**	**(BO)**
X-Short Links	Upper Front Passenger	10769	10236
10726	Upper Front Driver	10768	"
	Upper Rear Passenger	10771	"
	Upper Rear Driver	10770	"
	Lower Front Passenger	10247	10235

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Remote Pin-off with Standard Lower Links

Link Kit	Position	P/N	(BO)
Short Links	Upper Front Passenger	10765	10234
10722	Upper Front Driver	10764	"
	Upper Rear Passenger	10775	"
	Upper Rear Driver	10774	"
	Lower Front Passenger	10233	10233
	Lower Front Driver	10233	"
	Lower Rear Passenger	10783	"
	Lower Rear Driver	10782	"
Link Kit	**Position**	**P/N**	**(BO)**
Long Links	Upper Front Passenger	10761	10231
10720	Upper Front Driver	10760	"
	Upper Rear Passenger	10773	"
	Upper Rear Driver	10772	"
	Lower Front Passenger	10230	10230
	Lower Front Driver	10230	"
	Lower Rear Passenger	10781	"
	Lower Rear Driver	10780	"
Link Kit	**Position**	**P/N**	**(BO)**
X-Short Links	Upper Front Passenger	10769	10236
10724	Upper Front Driver	10768	"
	Upper Rear Passenger	10777	"
	Upper Rear Driver	10776	"
	Lower Front Passenger	10235	10235
	Lower Front Driver	10235	"
	Lower Rear Passenger	10785	"
	Lower Rear Driver	10784	"

Remote Pin-off with Slotted Lower Links

Link Kit	Position	P/N	(BO)
Short Links	Upper Front Passenger	10765	10234
10723	Upper Front Driver	10764	"
	Upper Rear Passenger	10775	"
	Upper Rear Driver	10774	"
	Lower	10245	10233
Link Kit	**Position**	**P/N**	**(BO)**
Long Links	Upper Front Passenger	10761	10231
10721	Upper Front Driver	10760	"
	Upper Rear Passenger	10773	"
	Upper Rear Driver	10772	"
	Lower	10243	10230
Link Kit	**Position**	**P/N**	**(BO)**
X-Short Links	Upper Front Passenger	10769	10236
10725	Upper Front Driver	10768	"
	Upper Rear Passenger	10777	"
	Upper Rear Driver	10776	"
	Lower Front Passenger	10247	10235

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4.6 Rear Link Variations (with Tapered Links)

Manual Pin-off with Standard Lower Links

Link Kit	Position	P/N	(BO)
Short Links	Upper Front Passenger	10765	10234
10735	Upper Front Driver	10764	"
	Upper Rear Passenger	10767	"
	Upper Rear Driver	10766	"
	Lower Front Passenger	10733	10732
	Lower Front Driver	10733	"
	Lower Rear Passenger	10787	"
	Lower Rear Driver	10786	"
Link Kit	**Position**	**P/N**	**(BO)**
Long Links	Upper Front Passenger	10761	10231
10695	Upper Front Driver	10760	"
	Upper Rear Passenger	10763	"
	Upper Rear Driver	10762	"
	Lower Links	10750	10753
Link Kit	**Position**	**P/N**	**(BO)**
X-Short Links	Upper Front Passenger	10769	10236
10797	Upper Front Driver	10768	"
	Upper Rear Passenger	10771	"
	Upper Rear Driver	10770	"
	Lower Links	10737	10739

Manual Pin-off with Slotted Lower Links

Link Kit	Position	P/N	(BO)
Short Links	Upper Front Passenger	10765	10234
10736	Upper Front Driver	10764	"
	Upper Rear Passenger	10767	"
	Upper Rear Driver	10766	"
	Lower	10730	10732
Link Kit	**Position**	**P/N**	**(BO)**
Long Links	Upper Front Passenger	10761	10231
10697	Upper Front Driver	10760	"
	Upper Rear Passenger	10763	"
	Upper Rear Driver	10762	"
	Lower	10755	10753
Link Kit	**Position**	**P/N**	**(BO)**
X-Short Links	Upper Front Passenger	10769	10236
10799	Upper Front Driver	10768	"
	Upper Rear Passenger	10771	"
	Upper Rear Driver	10770	"
	Lower Front Passenger	10738	10739

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Remote Pin-off with Standard Lower Links

Link Kit	Position	P/N	(BO)
Short Links	Upper Front Passenger	10765	10234
10722	Upper Front Driver	10764	"
	Upper Rear Passenger	10775	"
	Upper Rear Driver	10774	"
	Lower Front Passenger	10233	10233
	Lower Front Driver	10233	"
	Lower Rear Passenger	10783	"
	Lower Rear Driver	10782	"
Link Kit	**Position**	**P/N**	**(BO)**
Long Links	Upper Front Passenger	10761	10231
10720	Upper Front Driver	10760	"
	Upper Rear Passenger	10773	"
	Upper Rear Driver	10772	"
	Lower Front Passenger	10230	10230
	Lower Front Driver	10230	"
	Lower Rear Passenger	10781	"
	Lower Rear Driver	10780	"
Link Kit	**Position**	**P/N**	**(BO)**
X-Short Links	Upper Front Passenger	10769	10236
10724	Upper Front Driver	10768	"
	Upper Rear Passenger	10777	"
	Upper Rear Driver	10776	"
	Lower Front Passenger	10235	10235
	Lower Front Driver	10235	"
	Lower Rear Passenger	10785	"
	Lower Rear Driver	10784	"

Remote Pin-off with Slotted Lower Links

Link Kit	Position	P/N	(BO)
Short Links	Upper Front Passenger	10765	10234
10723	Upper Front Driver	10764	"
	Upper Rear Passenger	10775	"
	Upper Rear Driver	10774	"
	Lower	10245	10233
Link Kit	**Position**	**P/N**	**(BO)**
Long Links	Upper Front Passenger	10761	10231
10721	Upper Front Driver	10760	"
	Upper Rear Passenger	10773	"
	Upper Rear Driver	10772	"
	Lower	10243	10230
Link Kit	**Position**	**P/N**	**(BO)**
X-Short Links	Upper Front Passenger	10769	10236
10725	Upper Front Driver	10768	"
	Upper Rear Passenger	10777	"
	Upper Rear Driver	10776	"
	Lower Front Passenger	10247	10235

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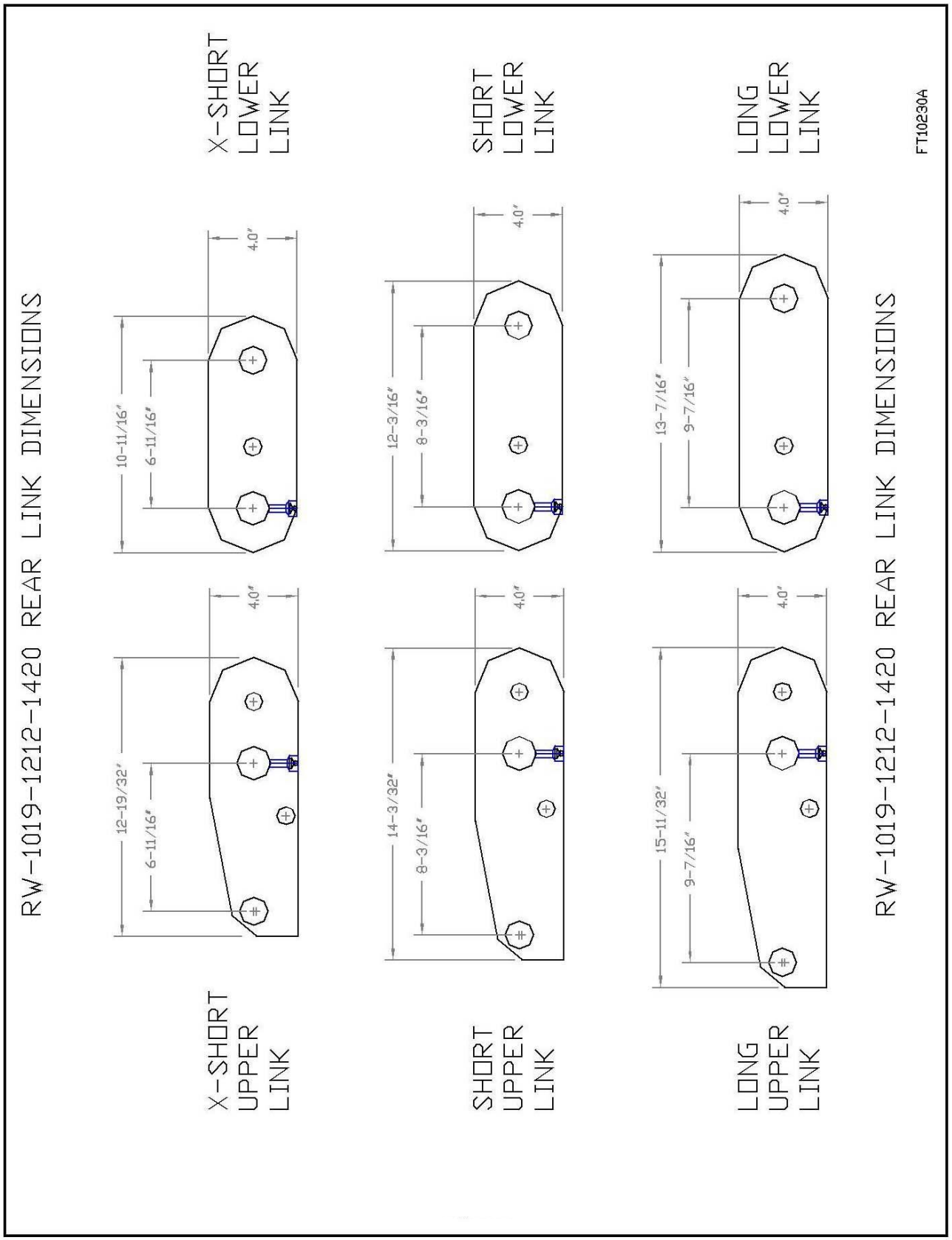
Drawing: Rear Link Dimensions



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5.0 FRONT TO REAR ALIGNMENT

5.1 Final Alignment

- The rear guidewheel axle is set parallel to the rear drive axle first (see *Drawing: Alignment Procedure & Traction Adjustment*). With the guidewheels in the rail position, recheck the side and diagonal measurements to the drive axle housing. The side measurements should be within 1/16" and the diagonals within 1/8".
- **Loosen the mounting bolts and slide the mounting bracket as necessary. Tighten the bolts.**
- The front guidewheel axle must be set square to the rear guidewheel axle: diagonally measure from the right front guidewheel to the left rear guidewheel ("D-1") then from the left front guidewheel to the right rear guidewheel ("D-2").
- These measurements must be within 1/4 inch. Measure from the left front guidewheel to the left rear guidewheel ("C-1") then from the right front guidewheel to the right rear guidewheel ("C-2"). These measurements must be within 1/8 inch.
- If "D-1" and "C-2" are shorter than "D-2" and "C-1", shim the right front railwheel forward. The left front guidewheel should be shimmed forward in the opposite case. These shims can be flat bar located between the bottom of the long arms and the welded stop block on the pivot arms.
- If the "C" dimensions are equal and the "D" dimensions are not, the front guidewheel axle can be slid to the side (within space limitations) to help equalize these dimensions. Maintain a minimum 1/4" gap between the guidewheel and the inside of the steering tire.
- Start with a 1/8th inch shim and place it between the stop block (welded to the pivot arm) and bottom of the stationary arm near the axle mounting bracket. All four pivot arms have stop blocks. Add shims as required so the load is carried by all blocks. When the proper spacer thickness has been found to square the guidewheels, tack each shim to the top of its stop block (per drawing below).
- If equipped with railsweeps, rotate each front axle tube half until the railsweep rubber is vertical. Weld (three 1/2" tacks) each axle tube half to its outside pivot arm. The inside pivot arms are not welded (allowing cylinder removal).
- After the Front and Rear Railroaders have been properly aligned, complete structural welds may be applied at these locations that were previously only tacked:
  - On the Front Railroader, between the Frame Mounting Bracket and Frame (or Frame Extensions, if required)
  - On the Front Railroader, between the Axle Tube and outside Pivot Arms (a continuous weld on the inboard side of the outside Pivot Arm is required)

NOTE:
For all structural welds, either low hydrogen rod or dual shield Mig wire should be used (refer to Appendix).

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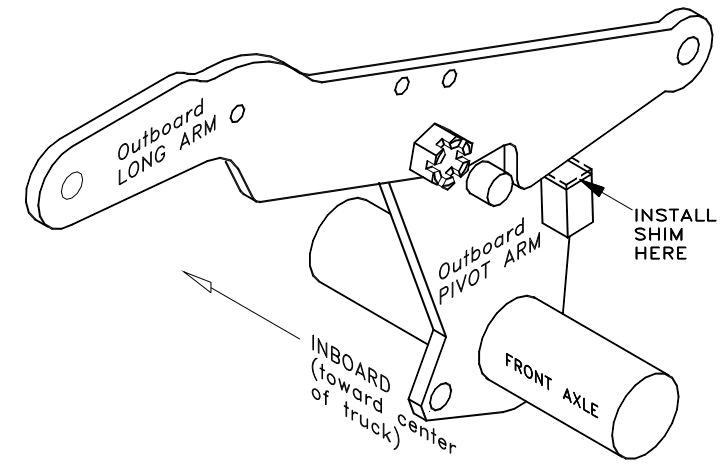
Figure 5-1



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Drawing: Alignment Procedure and Traction Adjustment

INSPECTOR: DATE:

SPECIFICATION	S/B = to	SPECIFICATION	TOLERANCES
A-1_____	=	A-2_____	± 1/16"
B-1_____	=	B-2_____	± 1/8"
C-1_____	=	C-2_____	± 1/8"
D-1_____	=	D-2_____	± 1/4"

ALIGNMENT PROCEDURE

A) STEPS 1) and 2) must be completed in listed order and are assumed to be within specifications and should only be addressed, if after alignment of the railgear, excessive flanging occurs.
1) Frame should be square, to within 1/8" maximum, on the diagonal.
2) Rear drive axle should be square to frame within 1-1/8" maximum on the diagonal to achieve 0° thrust angle. this should be checked by a qualified alignment shop.

B) The following procedure applies to shop or field inspection.
1) Check air pressure in all tires. tires should be inflated to the minimum rating of the wheel or tire.
2) Place vehicle on straight and level track, or 3" channel to simulate rail. Lower the railgear to the rail so that front to rear and diagonal measurements can be made. (Note: these measurements can be made from any convenient locations, as long as it stays consistent from side to side.
3) If diagonal measurement is out of tolerance, adjustment of the front railgear must be made. The procedure for this is as follows: Place shim material between the flat on the pivot arm and where it comes into contact with the axle bracket assembly. The location for the shim is most accessable from behind the front railgear axle. Once proper shimming has been obtained, weld the shim into place on the pivot arm.

TRACTION ADJUSTMENT PROCEDURE

A) The rear railgear is rigid and normally does not require re-adjustment of the vertical height. In the event that adequate traction is not present, vertical adjustment can be made as follows:
1) Grind off the welds on the (2) four hole mounting plates at the rear mounting bracket.
2) Loosen the (8) rear bracket mounting bolts.
3) Lower the railgear supporting the railgear with a floor jack or with the unit itself.
4) Remove or add spacer shim material located between the bottom of the truck frame and the shelf on the rear mounting bracket. Add shim to decrease traction and remove shim to increase traction.
5) Raise railgear once again to contact the bottom of the truck frame.
6) Re-tighten the rear mounting bracket bolts to 150 ft/lb. torque and re-tack the mounting plates to the bracket, and weld shims in.

REV	DATE	DESCRIPTION	BY	APP
A				
A				

TOLERANCES UNLESS SPECIFIED FRACT. ± 1/16 DECIMAL ± .030 .XX ± .010 .XXX ± .005 ANGLE ± 2° SURF FINISH 125 MICRO IREMOVE ALL BURRS & SHARP EDGES

DRAWN BY: TSH | APPD BY: | DATE: 12/20/91

TITLE: ALIGNMENT PROCEDURE & TEAR SHEET & TRACTION ADJUSTMENT PROCEDURES

DIVERSIFIED METAL FABRICATORS,INC/4043875-1512

DRAWING NUMBER: FT1436 | REV: #

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6.0 INSTALLATION OF OPTIONS

6.1 Rail Sweeps

The components that make up the standard Front and Rear Rail Sweeps are the same for Railroaders without any brakes For Rail Sweeps provided with Cobra Brakes, the mounting brackets are shorter. Installation of Rail Sweeps is done while the Railgear is in the rail position. For standard Rail Sweeps (without brakes), weld the Mounting Bracket directly to the Railgear Axle Tube oriented so that the Rubber is flush with the rail as shown in the Railsweep Drawing. For Rail Sweeps with Cobra Hydraulic Brakes, bolt the shorter Mounting Bracket directly to the Brake structure (on the front: bolt on the side facing forward, on the rear: bolt to the top of the Air Brake which faces backward). For more information, see the Railsweep Drawing.

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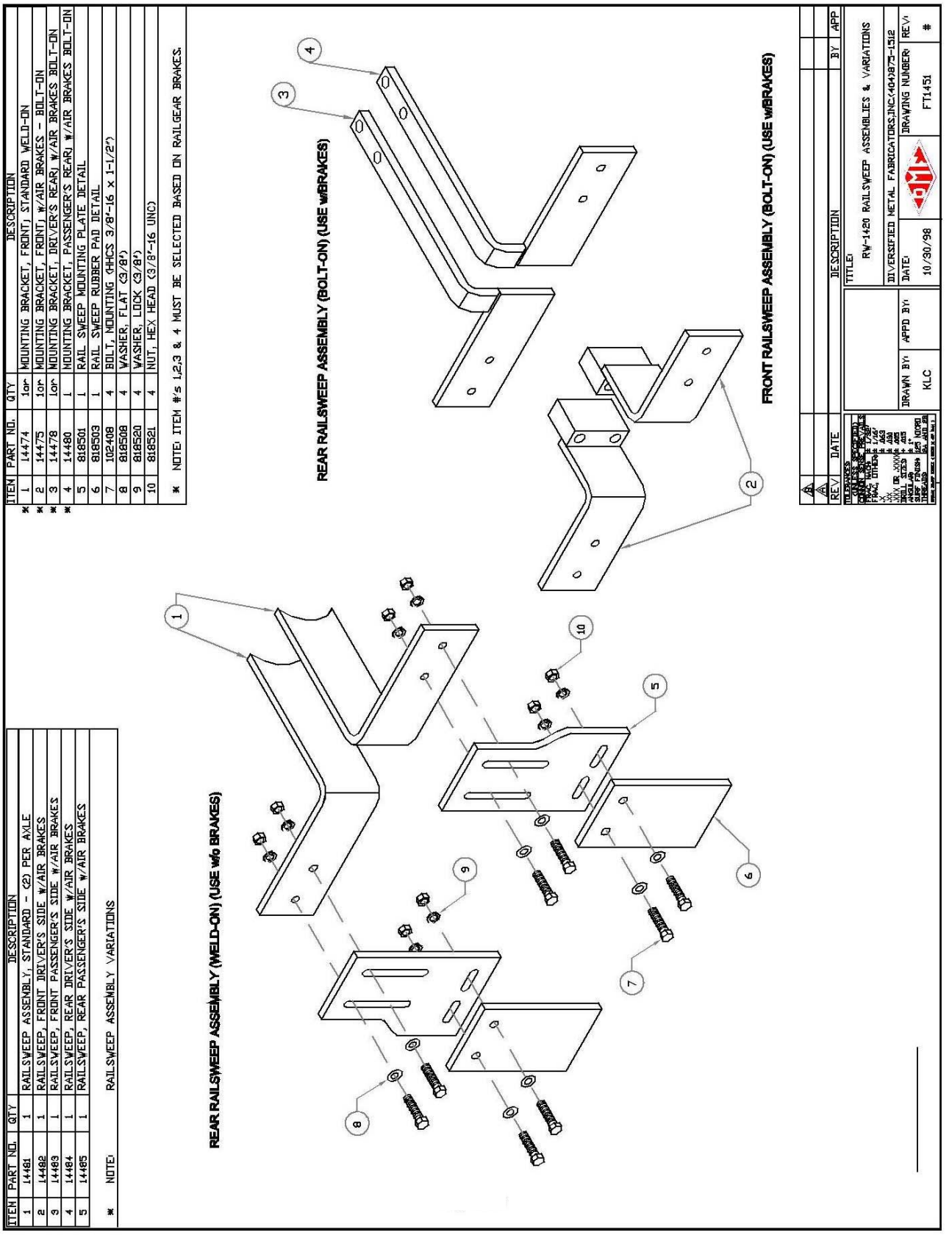
Drawing: Railsweep Assemblies and Variations


REAR RAILSWEEP ASSEMBLY (WELD-ON) (USE w/o BRAKES)
REAR RAILSWEEP ASSEMBLY (BOLT-ON) (USE w/BRAKES)
FRONT RAILSWEEP ASSEMBLY (BOLT-ON) (USE w/BRAKES)
ITEM | PART NO. | QTY | DESCRIPTION
1 | 14461 | 1 | RAILSWEEP ASSEMBLY, STANDARD - (2) PER AXLE
2 | 14482 | 1 | RAILSWEEP, FRONT DRIVER'S SIDE W/AIR BRAKES
3 | 14483 | 1 | RAILSWEEP, FRONT PASSENGER'S SIDE W/AIR BRAKES
4 | 14484 | 1 | RAILSWEEP, REAR DRIVER'S SIDE W/AIR BRAKES
5 | 14485 | 1 | RAILSWEEP, REAR PASSENGER'S SIDE W/AIR BRAKES
* NOTE: RAILSWEEP ASSEMBLY VARIATIONS
ITEM | PART NO. | QTY | DESCRIPTION
* 1 | 14474 | 1or | MOUNTING BRACKET, FRONT, STANDARD WELD-ON
* 2 | 14475 | 1or | MOUNTING BRACKET, FRONT W/AIR BRAKES - BOLT-ON
* 3 | 14478 | 1or | MOUNTING BRACKET, DRIVER'S REAR W/AIR BRAKES BOLT-ON
* 4 | 14480 | 1 | MOUNTING BRACKET, PASSENGER'S REAR W/AIR BRAKES BOLT-ON
5 | 818501 | 1 | RAIL SWEEP MOUNTING PLATE DETAIL
6 | 818503 | 1 | RAIL SWEEP RUBBER PAD DETAIL
7 | 102408 | 4 | BOLT, MOUNTING GHHCS 3/8"-16 x 1-1/2")
8 | 818508 | 4 | WASHER, FLAT (3/8")
9 | 818520 | 4 | WASHER, LOCK (3/8")
10 | 818521 | 4 | NUT, HEX HEAD (3/8"-16 UNC)
* NOTE: ITEM #'s 1,2,3 & 4 MUST BE SELECTED BASED ON RAILGEAR BRAKES.
REV | DATE | DESCRIPTION | BY | APP
TITLE: RW-1420 RAILSWEEP ASSEMBLIES & VARIATIONS
DIVERSIFIED METAL FABRICATORS,INC.(404)875-1512
DRAWN BY: KLC
APPD BY:
DATE: 10/30/98
DRAWING NUMBER: FT1451
REV: #

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6.2 Remote Pin/Off Pins

Reference *Drawing: Manual & Remote Pin-offs and Cables* in section 4.4.

Cable operated Pin-Offs are available on the Front (Single 3/4”) or Rear (Dual 1”). The Front Cable Remote Pin-Offs weld onto either the outer or (preferably) inner Long Arms.

The Rear Remote Pin-Offs components are shown in the Pin/Off Drawing. The Rear Remote Pin-offs can be operated with a manual cable assembly or air actuated. Remove the 1/4-20 hex nut, 7/16-14 hex end cap, and the internal tooth lock washer. Slide the cable through the fixed pin off plate. Replace the internal tooth lock washer, 7/16-14 hex end cap, and the 1/4-20 hex nut. Add a 1/4" lock washer on the end of the cable, and screw the cable into the sliding pin plate. Tighten the 1/4-20 hex nut on to the lock washer and pin plate.

Mount two, cable handle, mounting plates (not supplied). These plates should have a 3/4" hole to attach the handle end of the cable to. This plate should be securely located near the rear rail wheel valve. Remove the "T" handle and the 5/8-11 hex end cap. Thread the cable through the mounting plate and replace the 5/8-11 hex end cap. Replace the T- handle on the cable.

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6.3 Steering Wheel Locks

Carefully remove the face cover from the steering wheel. Position the Lock Bracket at the 12 o'clock position on the steering wheel hub. The "U" should be facing the speedometer, and at the lower edge of the steering wheel. The Lock Bracket should not interfere with any other part of the truck as the steering wheel is turned. Mark the hole locations and drill (2) 3/16" holes. Using the #10-24 flat socket head screws and the #10-24 nuts; attach the Lock Bracket.

Strap the Latch Weldment around the column and tighten until the clamp starts to grip. With the latch in the down position, move the Latch Pin into line with the Lock Bracket. There should be a 1/2" gap between the Lock Bracket and the Latch Weldment. Tighten the Latch Weldment hose clamp securely.

NOTE:
Check to be sure that nothing interferes with the normal operation of the steering wheel. Check the operation of the latch for fit and operation with the Lock Bracket.

After making all necessary adjustments, drill a .125" hole through the column strap at the loose end, near the truck's turn signal. Use a 1/8" x 3/4" pop rivet to secure the column strap and the Latch Weldment into place. Replace steering wheel cover. For more information, see the Steering Wheel Lock Drawing.

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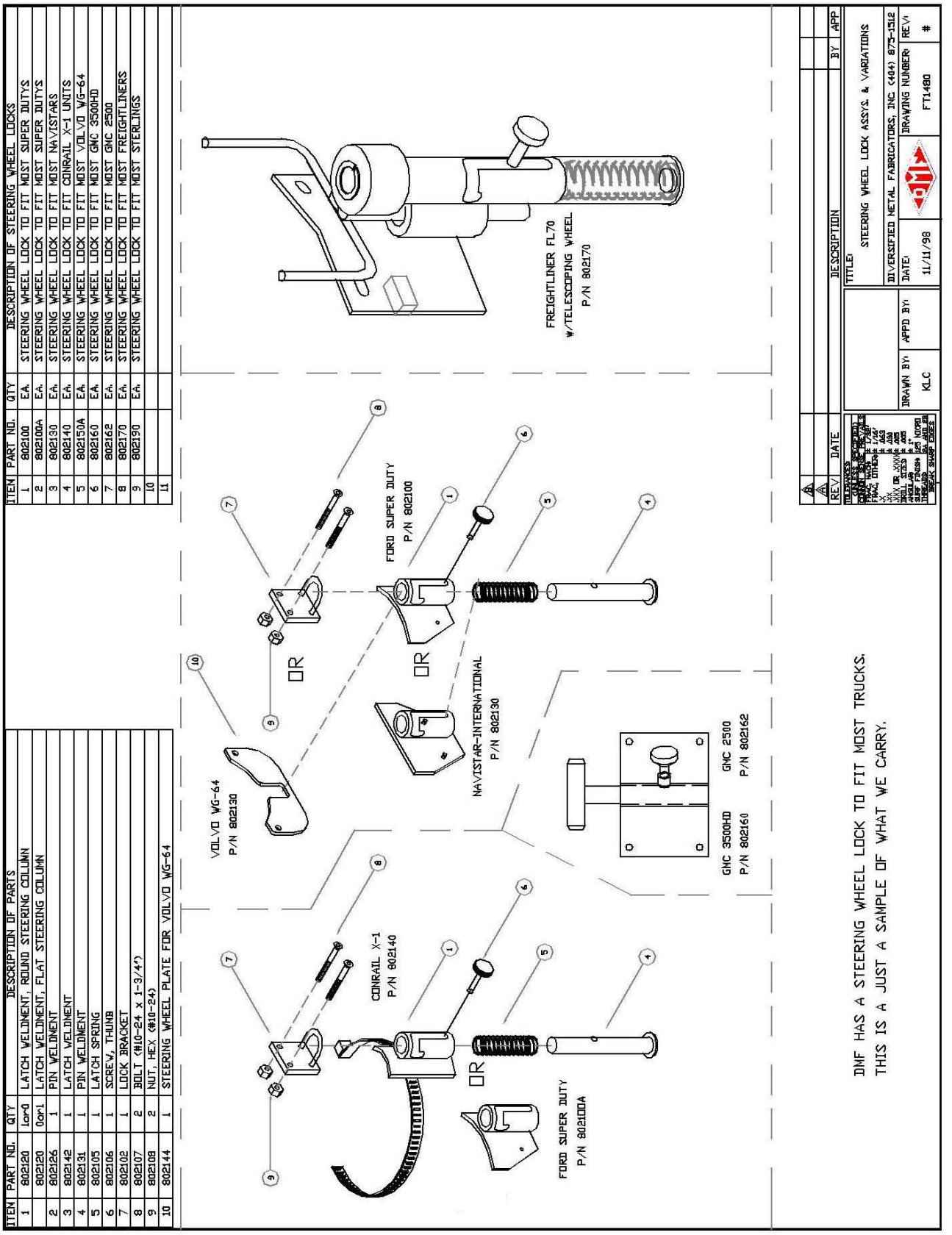
Drawing: Steering Wheel Lock Assemblies


DESCRIPTION OF PARTS
ITEM | PART NO. | QTY | DESCRIPTION
1 | 802120 | 1or0 | LATCH WELDMENT, ROUND STEERING COLUMN
802120 | 0or1 | LATCH WELDMENT, FLAT STEERING COLUMN
2 | 802126 | 1 | PIN WELDMENT
3 | 802142 | 1 | LATCH WELDMENT
4 | 802131 | 1 | PIN WELDMENT
5 | 802105 | 1 | LATCH SPRING
6 | 802106 | 1 | SCREW, THUMB
7 | 802102 | 1 | LOCK BRACKET
8 | 802107 | 2 | BOLT (#10-24 x 1-3/4")
9 | 802108 | 2 | NUT, HEX (#10-24)
10 | 802144 | 1 | STEERING WHEEL PLATE FOR VOLVO WG-64
DESCRIPTION OF STEERING WHEEL LOCKS
ITEM | PART NO. | QTY | DESCRIPTION
1 | 802100 | EA. | STEERING WHEEL LOCK TO FIT MOST SUPER DUTYS
2 | 802100A | EA. | STEERING WHEEL LOCK TO FIT MOST SUPER DUTYS
3 | 802130 | EA. | STEERING WHEEL LOCK TO FIT MOST NAVISTARS
4 | 802140 | EA. | STEERING WHEEL LOCK TO FIT CONRAIL X-1 UNITS
5 | 802150A | EA. | STEERING WHEEL LOCK TO FIT MOST VOLVO WG-64
6 | 802160 | EA. | STEERING WHEEL LOCK TO FIT MOST GMC 3500HD
7 | 802162 | EA. | STEERING WHEEL LOCK TO FIT MOST GMC 2500
8 | 802170 | EA. | STEERING WHEEL LOCK TO FIT MOST FREIGHTLINERS
9 | 802190 | EA. | STEERING WHEEL LOCK TO FIT MOST STERLINGS
10
11
FREIGHTLINER FL70
W/TELESCOPING WHEEL
P/N 802170
FORD SUPER DUTY
P/N 802100
OR
NAVISTAR-INTERNATIONAL
P/N 802130
VOLVO WG-64
P/N 802130
GMC 3500HD
P/N 802160
GMC 2500
P/N 802162
CONRAIL X-1
P/N 802140
FORD SUPER DUTY
P/N 802100A
DMF HAS A STEERING WHEEL LOCK TO FIT MOST TRUCKS.
THIS IS A JUST A SAMPLE OF WHAT WE CARRY.
REV | DATE | DESCRIPTION | BY | APP
DRAWN BY KLC
APPD BY
DATE 11/11/98
TITLE: STEERING WHEEL LOCK ASSYS. & VARIATIONS
DIVERSIFIED METAL FABRICATORS, INC (440) 975-1512
DRAWING NUMBER FT1480
REV #

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NOTE:
There are two types of brakes available for the RW-1420 Railgear. Be sure to correctly identify which brake system you will be or are currently using.

Read all instructions and check that all required parts and Kits are included before beginning the installation. The proper installation of this equipment is solely the responsibility of you, the authorized installer. When in doubt, contact DMF for assistance.

6.4 Hydraulic Brake Connections

NOTE:
The rail wheel brake system is intended to assist the existing vehicle brakes when in the rail mode. As the vehicle rear tires are in contact with the railhead, the primary braking effort is derived from the rubber tires. Rail wheel brakes alone are insufficient to stop the vehicle in a reasonable distance.

- Refer to *Drawing: Hydraulic System (Old Style)* and *Drawing: Hydraulic System (New Style)* in section 2.3 for more information. The wheels and brake assemblies are on the axles. The brake valving is pre-plumbed from the solenoid diverter valve through the brake relief valve.
- Attach the 48” braided steel hoses to the wheel cylinders on the brake assemblies. Run the lines along the outboard side of the pivot arms to the pivot pin. Leave a little slack hose looping around the front side of the pivot pin and run the hose up along the outboard side of the outboard long arms and over the top of each pair of long arms to the center of the vehicle. The hoses are attached to the long arms with “J” clips just above the pivot pins. These hoses are joined at the center of the vehicle, above the railgear with a brass tee. Connect the brake relief valve port marked “**FB**” to this tee with a 48” braided steel hose.

Four wheel brake kits only:

- Connect the rear pressure reducing valve port “**RB**” to the rear braided steel hose tee with the supplied 25' steel line. Shorten or coil the excess of this line as necessary. Tie-strap the upper end of the rear, braided hose to the center of the rear mounting bracket.

All Units with Optional Brakes:

- The brake control panel consists of a double pole, single throw switch and an indicator lamp. The lamp is connected to the switch by the red lead and is to be grounded by the black lead. Locate a suitable spot for the control panel.
- Connect the lamp ground to a location under the instrument panel. Connect the center terminals of the switch (the ones with the jumper wire) to the "cold" side of the stop lamp switch (at the brake pedal) with a wire tap connector.

NOTE:
On Fords, connect the center terminals of the brake switch to the “C210” terminal under the instrument panel.

One of the two remaining terminals of the switch is wired out to the (grounding) control terminal on the power unit (the same one that the push button switches are wired to). The last terminal is wired out to the tab terminal on the brake solenoid diverter valve.

- When the control panel is properly wired, the indicator lamp will illuminate, the solenoid valve will spool (the coil will get warm), and the power unit will operate when the switch is

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in the "on" position and the brake pedal is depressed far enough to trip the stop lamp switch.

- While an assistant depresses the brake pedal, loosen the bleeder fitting at each brake until the air is expelled. As the system is bled, keep fluid in the reservoir to prevent pumping air back into the lines. Bleed each wheel once then repeat to make certain that all the air is bled out.

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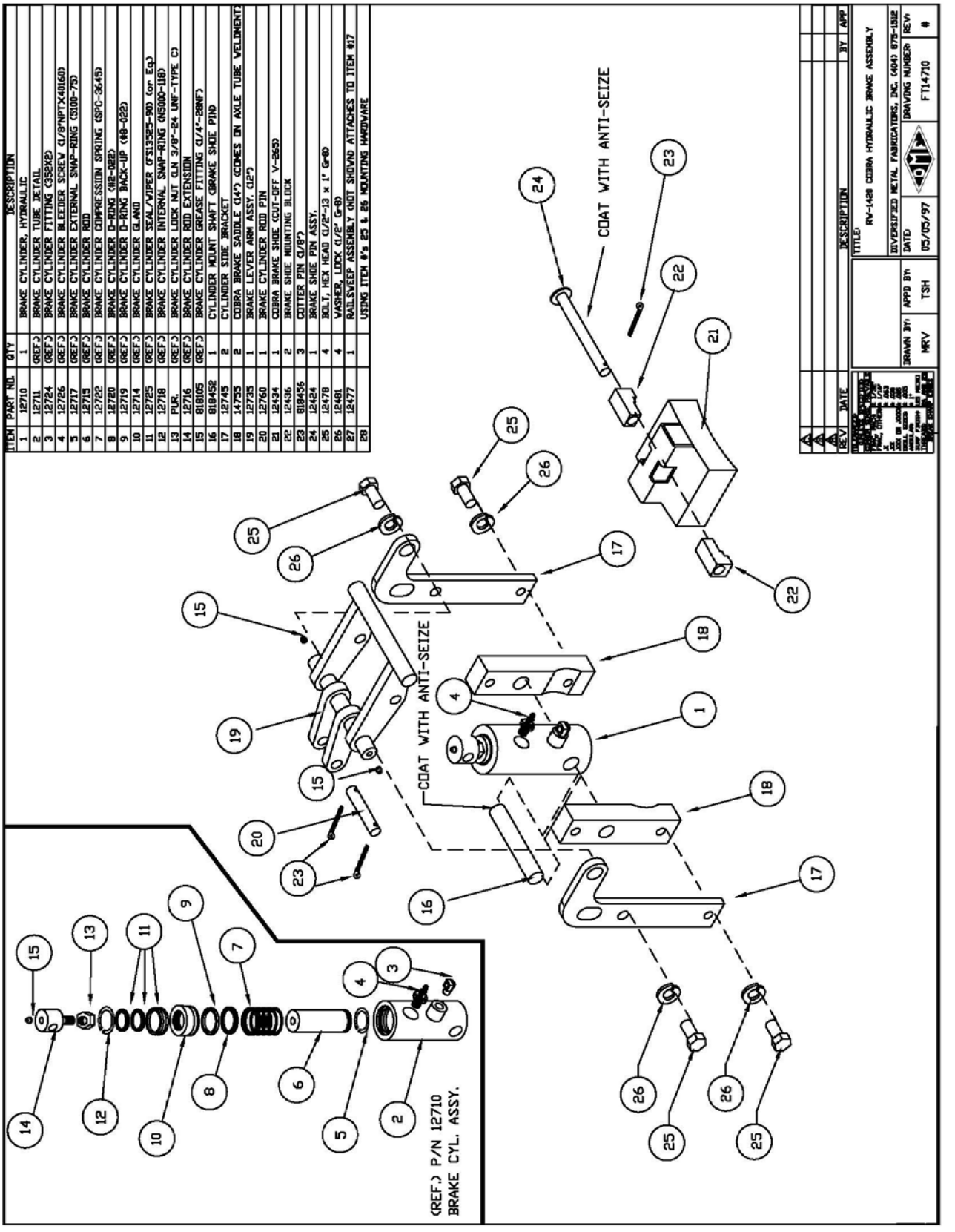
Drawing: Hydraulic Brake Assemblies


ITEM | PART NO. | QTY | DESCRIPTION
1 | 12710 | 1 | BRAKE CYLINDER, HYDRAULIC
2 | 12711 | (REF.) | BRAKE CYLINDER TUBE DETAIL
3 | 12724 | (REF.) | BRAKE CYLINDER FITTING (3824P)
4 | 12726 | (REF.) | BRAKE CYLINDER BLEEDER SCREW (1/8"NPTX40160)
5 | 12717 | (REF.) | BRAKE CYLINDER EXTERNAL SNAP-RING (5100-75)
6 | 12715 | (REF.) | BRAKE CYLINDER ROD
7 | 12722 | (REF.) | BRAKE CYLINDER COMPRESSION SPRING (SPC-3645)
8 | 12720 | (REF.) | BRAKE CYLINDER O-RING (182-022)
9 | 12719 | (REF.) | BRAKE CYLINDER O-RING BACK-UP (M8-022)
10 | 12714 | (REF.) | BRAKE CYLINDER GLAND
11 | 12725 | (REF.) | BRAKE CYLINDER SEAL/WIPER (FSI3525-90D (or Eq.)
12 | 12718 | (REF.) | BRAKE CYLINDER INTERNAL SNAP-RING (N5000-118)
13 | PUR. | (REF.) | BRAKE CYLINDER LOCK NUT (LN 3/8"-24 UNF-TYPE C)
14 | 12716 | (REF.) | BRAKE CYLINDER ROD EXTENSION
15 | 618105 | (REF.) | BRAKE CYLINDER GREASE FITTING (1/4"-28NF)
16 | 618452 | 1 | CYLINDER MOUNT SHAFT (BRAKE SHOE PIN)
17 | 12745 | 2 | CYLINDER SIDE BRACKET
18 | 14795 | 2 | COBRA BRAKE SADDLE (14") (COMES ON AXLE TUBE WELDMENT)
19 | 12735 | 1 | BRAKE LEVER ARM ASSY. (12")
20 | 12760 | 1 | BRAKE CYLINDER ROD PIN
21 | 12434 | 1 | COBRA BRAKE SHOE (CUT-OFF V-255)
22 | 12436 | 2 | BRAKE SHOE MOUNTING BLOCK
23 | 618456 | 3 | COTTER PIN (1/8")
24 | 12424 | 1 | BRAKE SHOE PIN ASSY.
25 | 12478 | 4 | BOLT, HEX HEAD (1/2-13 x 1" Gr5)
26 | 12481 | 4 | WASHER, LOCK (1/2" Gr5)
27 | 12477 | 1 | RAILSWEEP ASSEMBLY (NOT SHOWN ATTACHES TO ITEM #17
28 | | | USING ITEM #'s 25 & 26 MOUNTING HARDWARE
COAT WITH ANTI-SEIZE
COAT WITH ANTI-SEIZE
(REF.) P/N 12710
BRAKE CYL. ASSY.
REV | DATE | DESCRIPTION | BY | APP
DRAWN BY: MRV
APPD BY: TSH
DATED 05/05/97
TITLE: RW-1420 COBRA HYDRAULIC BRAKE ASSEMBLY
DIVERSIFIED METAL FABRICATORS, INC. (404) 875-1512
DRAWING NUMBER FT14710
REV: #

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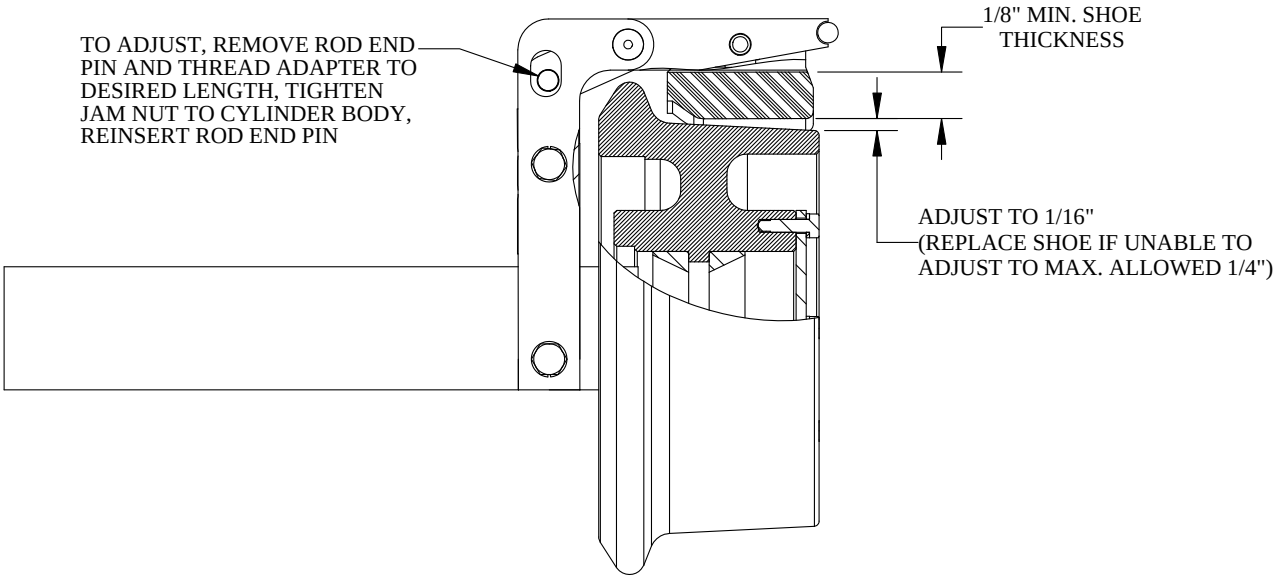
Drawing: Hydraulic Brake Adjustment


TO ADJUST, REMOVE ROD END PIN AND THREAD ADAPTER TO DESIRED LENGTH, TIGHTEN JAM NUT TO CYLINDER BODY, REINSERT ROD END PIN
1/8" MIN. SHOE THICKNESS
ADJUST TO 1/16" (REPLACE SHOE IF UNABLE TO ADJUST TO MAX. ALLOWED 1/4")

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6.5 Air Brake Connections

Mechanical Installation

- Remove the guide wheels from the axle(s) to receive airbrakes.
- Remove the electric brake assemblies. The brakes are attached to the guide wheel axle tube with three one inch welds. Torch (or air-arc) the welds loose. Disconnect and remove the brake controller and wiring.
- Remove the front guide wheel steering guide bars. Torch off the 1-1/4" diameter guide bars that are welded to the guide wheel axle, pass over the guide wheel flange, and extend out beyond the tread rim.
- Grind the axle tube clean.
- Operate the guide wheels into the Hi-Rail position.
- **On the front axle,** the airbrake assemblies replace the steering guide bars. The brake assembly has a 1" diameter steering guide bar built-in. Remove the Cobra shoe from each assembly by unbolting the shoe retainer blocks from the pivot arm weldment. Refer to *Drawing: Air Brake Assembly*. Position the assembly vertically (over the guide wheel axle) and one inch in from the end of the axle tube. Refer to *Drawing: Air Brake Installation*. Tack the mounting plates to the axle tube. Refer to *Drawing: Air Brake Assembly*.
- **On the rear axle,** the airbrake assemblies are mounted on the rearward side and angled slightly below horizontal. Remove the Cobra shoe from each assembly by unbolting the shoe retainer blocks from the pivot arm weldment. Refer to *Drawing: Air Brake Assembly*. Position the brake assembly, one inch from the end of the axle tube and leave 1/8" clearance between the chamber and the lower scissors link. Refer to DWG 818402. Tack the mounting plates to the axle tube. Refer to *Drawing: Air Brake Assembly*. Weld the mounting plates to the axle tubes with 1/8 to 3/16" fillets.
- Install the guide wheels.
- Check for clearance.
- **On the front axle,** the brake assembly should be located vertically over the axle and vertically behind the wheel. The assembly should be roughly 1/4" clear of all parts of the wheel.
- **On the rear axle,** the assembly is angled slightly down from horizontal so that the chamber will clear the scissors link by 1/8". All other clearances to the wheel should be roughly 1/4".
- Replace the Cobra shoes in the brake assemblies.
- Adjust the chamber clevis until the shoe is just clear of the wheel.

Plumbing Installation

- An air toggle valve, labeled brakes "on/off", is located on the vehicle instrument panel. This valve disconnects the guide wheel braking system from the vehicle airbrake system by interrupting the CONTROL line air pressure to the guide wheel system only.
- Near the front (and rear, if equipped) guide wheel axle an airbrake relay valve will be located. The CONTROL line to this relay valve comes from the toggle valve described above. The SUPPLY line to this relay comes from the vehicle supply system or directly from the main air tanks.
- There is a ball valve and an adjustable pressure regulator in the SUPPLY line before the relay valve. The ball valve will disconnect the guide wheel braking system from the vehicle airbrake system (regardless of the position of the toggle valve) by interrupting the SUPPLY line air pressure to the guide wheel system only.
- The adjustable pressure regulator allows the braking effort on each axle set to be set so that the guide wheels do not lockup and slide.
- The guide wheel brake chambers are connected to the SERVICE ports on the guide wheel air brake relay valve. Install the airlines and valves per DMF instructions. Make certain that the valve assembly for the front indicates that it has been preset to 75 psi.

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Testing

Put the vehicle on a test track. With the "on/off" toggle valve "on" and the ball valve(s) open, check that:

- ❑ The guide wheel brakes tightly clamp the rail wheel when the vehicle brake pedal is depressed.
- ❑ The brakes properly release when the brake pedal is released.
- ❑ The guide wheels do not slide when the guide wheel brakes are applied.

NOTE:

The rail wheel brake system is intended to assist the existing vehicle brakes when in the rail mode. As the vehicle rear tires are in contact with the railhead, the primary braking effort is derived from the rubber tires. Rail wheel brakes alone are insufficient to stop the vehicle in a reasonable distance.

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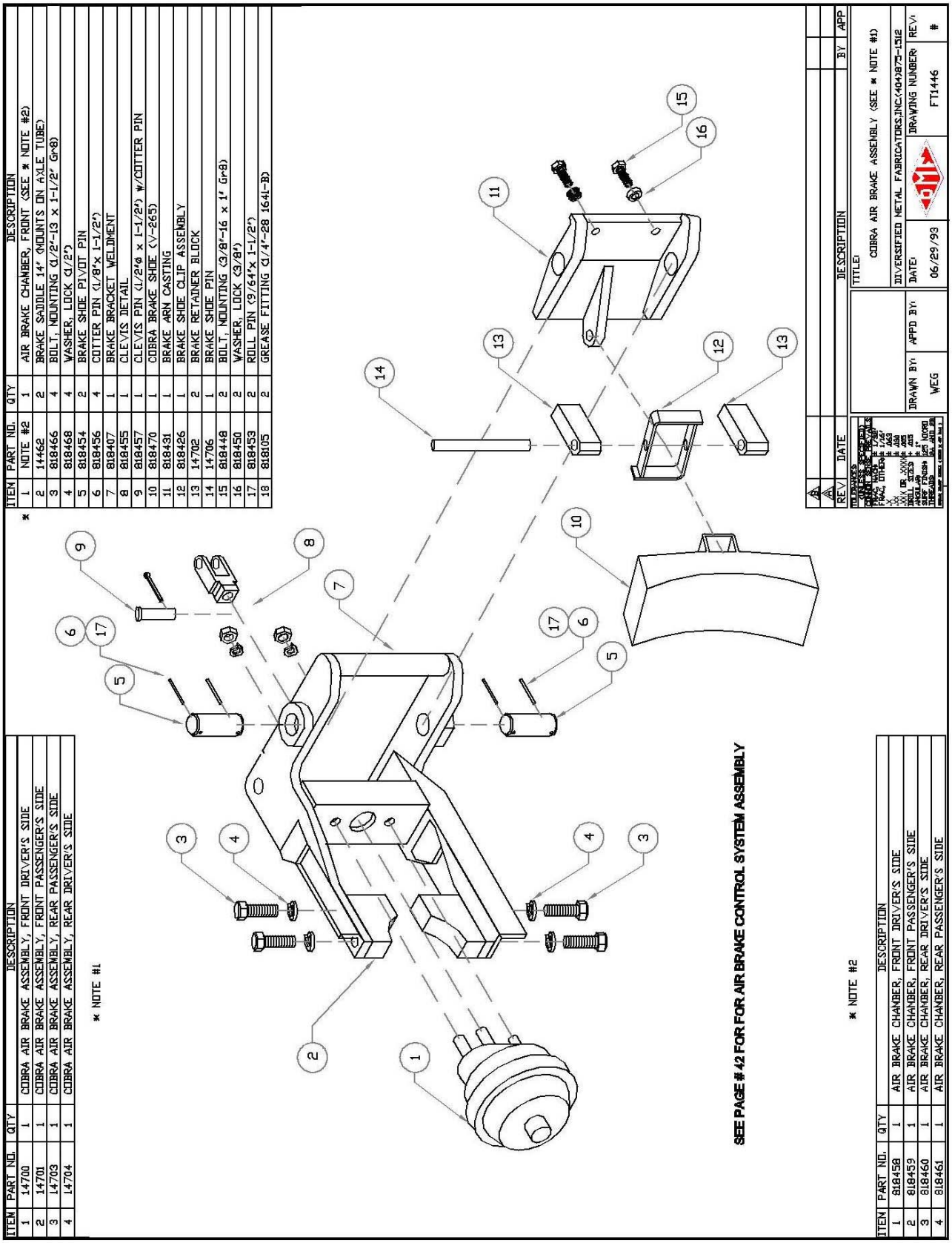
Drawing: Air Brake Assembly


ITEM PART NO. QTY DESCRIPTION
1 NOTE #2 1 AIR BRAKE CHAMBER, FRONT (SEE * NOTE #2)
2 14462 2 BRAKE SADDLE 14" (MOUNTS ON AXLE TUBE)
3 818466 4 BOLT, MOUNTING (1/2"-13 x 1-1/2" Gr-8)
4 818468 4 WASHER, LOCK (1/2")
5 818454 2 BRAKE SHOE PIVOT PIN
6 818456 4 COTTER PIN (1/8"x 1-1/2")
7 818407 1 BRAKE BRACKET WELDMENT
8 818455 1 CLEVIS DETAIL
9 818457 1 CLEVIS PIN (1/2"ø x 1-1/2") W/COTTER PIN
10 818470 1 COBRA BRAKE SHOE (V-265)
11 818431 1 BRAKE ARM CASTING
12 818426 1 BRAKE SHOE CLIP ASSEMBLY
13 14702 2 BRAKE RETAINER BLOCK
14 14706 1 BRAKE SHOE PIN
15 818448 2 BOLT, MOUNTING (3/8"-16 x 1" Gr-8)
16 818450 2 WASHER, LOCK (3/8")
17 818453 2 ROLL PIN (9/64"x 1-1/2")
18 818105 2 GREASE FITTING (1/4"-28 1641-B)
* NOTE #1
ITEM PART NO. QTY DESCRIPTION
1 14700 1 COBRA AIR BRAKE ASSEMBLY, FRONT DRIVER'S SIDE
2 14701 1 COBRA AIR BRAKE ASSEMBLY, FRONT PASSENGER'S SIDE
3 14703 1 COBRA AIR BRAKE ASSEMBLY, REAR PASSENGER'S SIDE
4 14704 1 COBRA AIR BRAKE ASSEMBLY, REAR DRIVER'S SIDE
* NOTE #2
ITEM PART NO. QTY DESCRIPTION
1 818458 1 AIR BRAKE CHAMBER, FRONT DRIVER'S SIDE
2 818459 1 AIR BRAKE CHAMBER, FRONT PASSENGER'S SIDE
3 818460 1 AIR BRAKE CHAMBER, REAR DRIVER'S SIDE
4 818461 1 AIR BRAKE CHAMBER, REAR PASSENGER'S SIDE
SEE PAGE #42 FOR FOR AIR BRAKE CONTROL SYSTEM ASSEMBLY
REV DATE DESCRIPTION BY APP
DRAWN BY: WEG
APPD BY:
TITLE: COBRA AIR BRAKE ASSEMBLY (SEE * NOTE #1)
DIVERSIFIED METAL FABRICATORS,INC.(404)875-1512
DATE: 06/29/93
DRAWING NUMBER FT1446
REV: #

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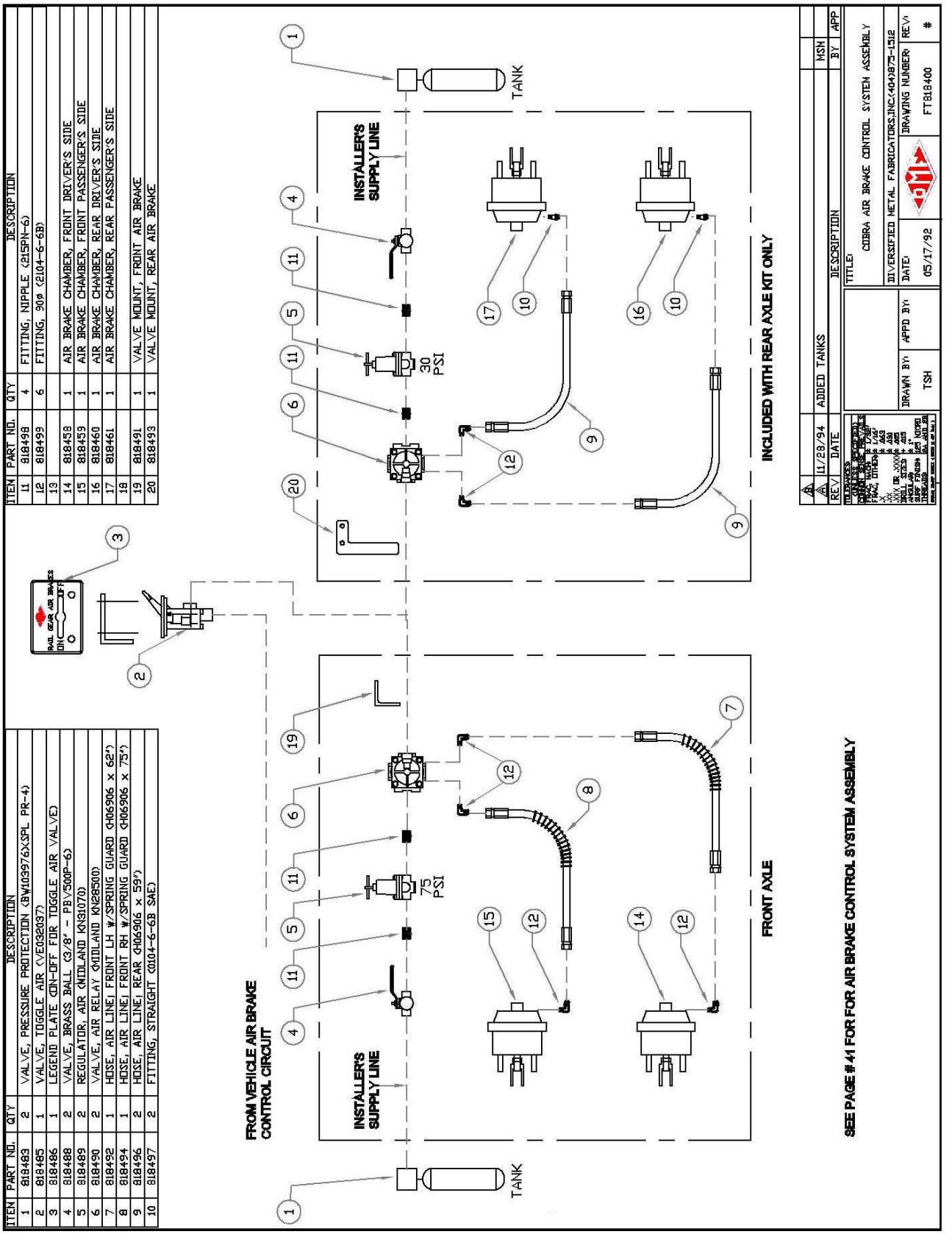
Drawing: Air Brake Control System Assembly


ITEM | PART NO. | QTY | DESCRIPTION
1 | 818483 | 2 | VALVE, PRESSURE PROTECTION (BW1039765XSPL PR-4)
2 | 818485 | 1 | VALVE, TOGGLE AIR (VE032097)
3 | 818486 | 1 | LEGEND PLATE (ON-OFF FOR TOGGLE AIR VALVE)
4 | 818488 | 2 | VALVE, BRASS BALL (3/8" - PBV500P-6)
5 | 818489 | 2 | REGULATOR, AIR (MIDLAND KN91070)
6 | 818490 | 2 | VALVE, AIR RELAY (MIDLAND KN288500)
7 | 818492 | 1 | HOSE, AIR LINE, FRONT LH W/SPRING GUARD (H06906 x 62")
8 | 818494 | 1 | HOSE, AIR LINE, FRONT RH W/SPRING GUARD (H06906 x 75")
9 | 818496 | 2 | HOSE, AIR LINE, REAR (H06906 x 59")
10 | 818497 | 2 | FITTING, STRAIGHT (0104-6-6B SAE)
11 | 818498 | 4 | FITTING, NIPPLE (2SPN-6)
12 | 818499 | 6 | FITTING, 90° (2104-6-6B)
13
14 | 818458 | 1 | AIR BRAKE CHAMBER, FRONT DRIVER'S SIDE
15 | 818459 | 1 | AIR BRAKE CHAMBER, FRONT PASSENGER'S SIDE
16 | 818460 | 1 | AIR BRAKE CHAMBER, REAR DRIVER'S SIDE
17 | 818461 | 1 | AIR BRAKE CHAMBER, REAR PASSENGER'S SIDE
18
19 | 818491 | 1 | VALVE MOUNT, FRONT AIR BRAKE
20 | 818493 | 1 | VALVE MOUNT, REAR AIR BRAKE
FROM VEHICLE AIR BRAKE CONTROL CIRCUIT
INSTALLER'S SUPPLY LINE
TANK
75 PSI
FRONT AXLE
30 PSI
INCLUDED WITH REAR AXLE KIT ONLY
SEE PAGE #41 FOR FOR AIR BRAKE CONTROL SYSTEM ASSEMBLY
A 11/28/94 ADDED TANKS MSM
REV DATE DESCRIPTION BY APP
DRAWN BY TSH
APPD BY
DATE 05/17/92
TITLE: COBRA AIR BRAKE CONTROL SYSTEM ASSEMBLY
DIVERSIFIED METAL FABRICATORS,INC.(404)875-1512
DRAWING NUMBER FT818400
REV #

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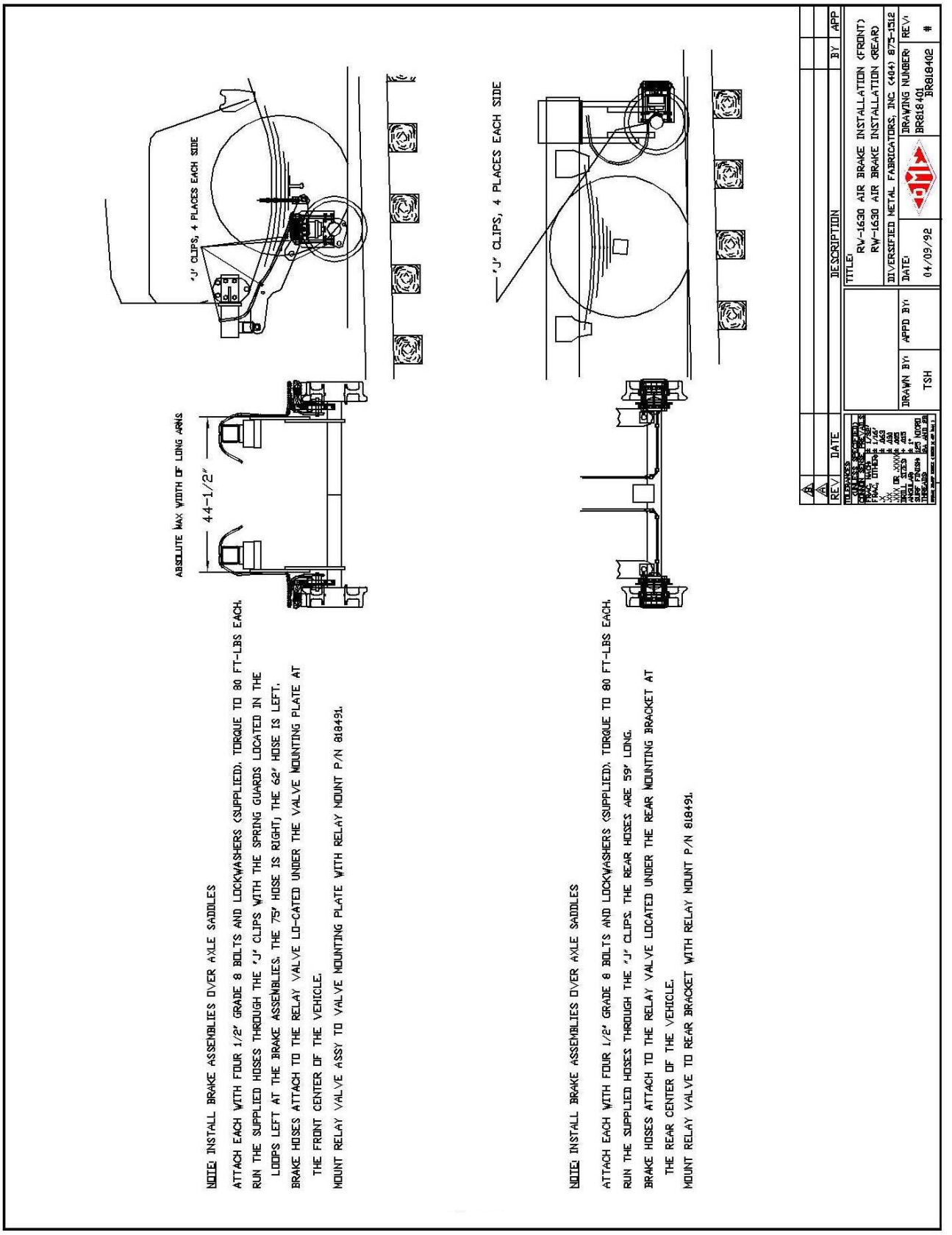
Drawing: Air Brake Installation


"J" CLIPS, 4 PLACES EACH SIDE
ABSOLUTE MAX WIDTH OF LONG ARMS
44-1/2"
NOTE: INSTALL BRAKE ASSEMBLIES OVER AXLE SADDLES
ATTACH EACH WITH FOUR 1/2" GRADE 8 BOLTS AND LOCKWASHERS (SUPPLIED). TORQUE TO 80 FT-LBS EACH.
RUN THE SUPPLIED HOSES THROUGH THE "J" CLIPS WITH THE SPRING GUARDS LOCATED IN THE LOOPS LEFT AT THE BRAKE ASSEMBLIES. THE 75" HOSE IS RIGHT, THE 62" HOSE IS LEFT.
BRAKE HOSES ATTACH TO THE RELAY VALVE LOCATED UNDER THE VALVE MOUNTING PLATE AT THE FRONT CENTER OF THE VEHICLE.
MOUNT RELAY VALVE ASSY TO VALVE MOUNTING PLATE WITH RELAY MOUNT P/N 818491.
"J" CLIPS, 4 PLACES EACH SIDE
NOTE: INSTALL BRAKE ASSEMBLIES OVER AXLE SADDLES
ATTACH EACH WITH FOUR 1/2" GRADE 8 BOLTS AND LOCKWASHERS (SUPPLIED). TORQUE TO 80 FT-LBS EACH.
RUN THE SUPPLIED HOSES THROUGH THE "J" CLIPS. THE REAR HOSES ARE 59" LONG.
BRAKE HOSES ATTACH TO THE RELAY VALVE LOCATED UNDER THE REAR MOUNTING BRACKET AT THE REAR CENTER OF THE VEHICLE.
MOUNT RELAY VALVE TO REAR BRACKET WITH RELAY MOUNT P/N 818491.
REV DATE DESCRIPTION BY APP
TITLE: RW-1630 AIR BRAKE INSTALLATION (FRONT)
RW-1630 AIR BRAKE INSTALLATION (REAR)
DIVERSIFIED METAL FABRICATORS, INC (404) 875-1512
DRAWN BY TSH
APPD BY
DATE 04/09/92
DRAWING NUMBER BR818401
BR818402
REV #

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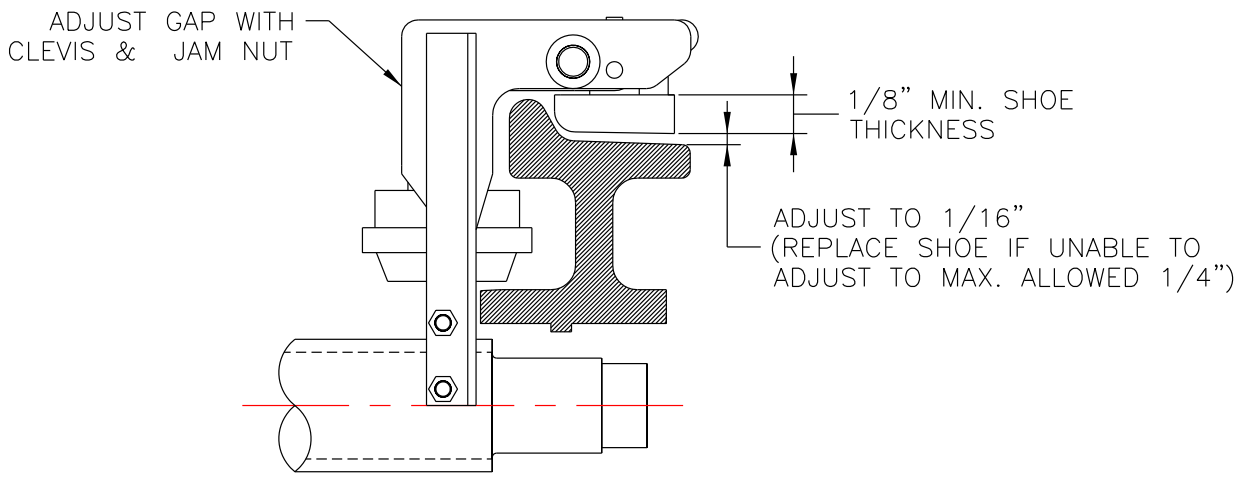
Drawing: Air Brake Adjustment



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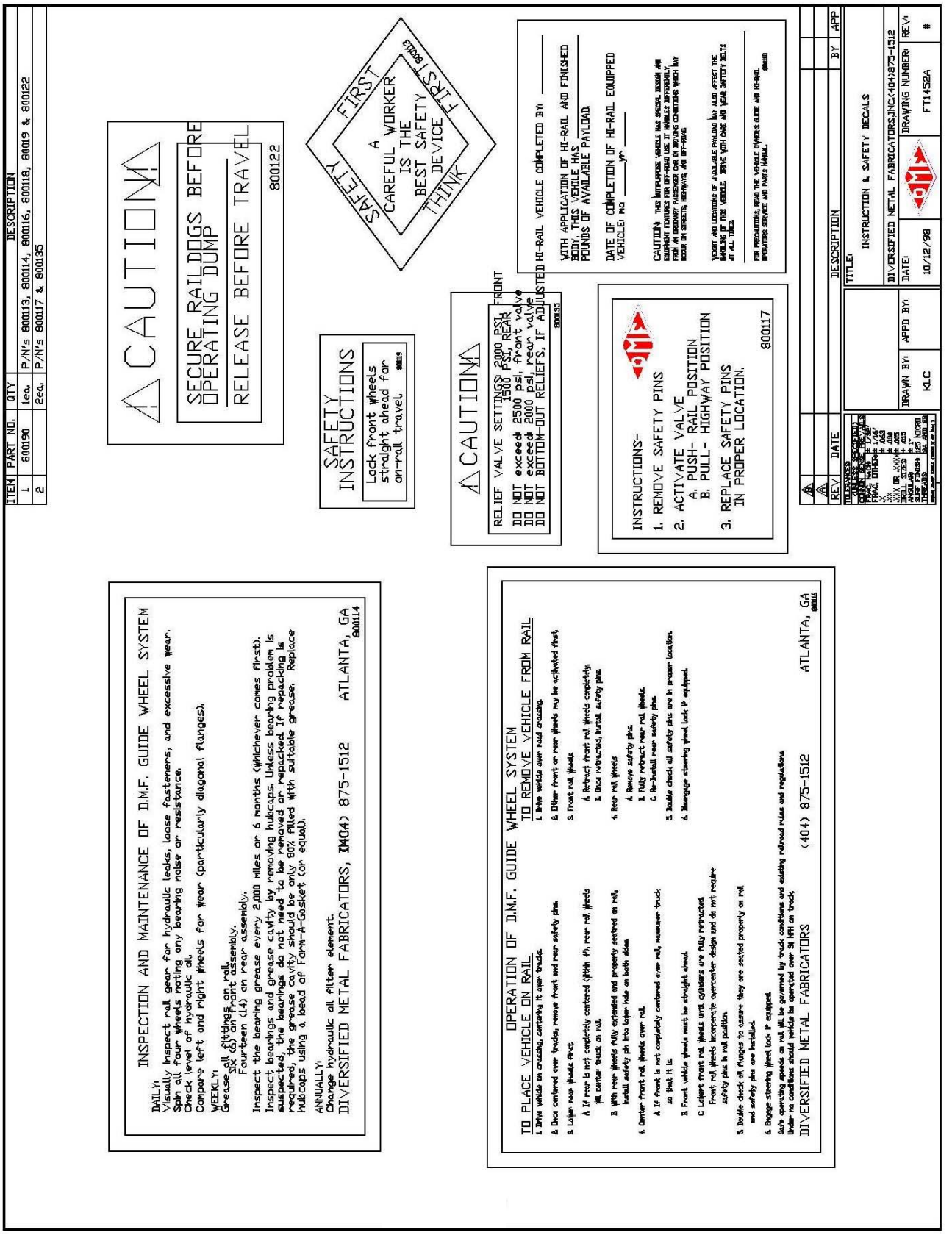
6.6 Instruction and Safety Decals


ITEM | PART NO. | QTY | DESCRIPTION
1 | 800190 | 1ea. | P/N's 800113, 800114, 800116, 800118, 80019 & 800122
2 | | 2ea. | P/N's 800117 & 800135
CAUTION
SECURE RAILDOGS BEFORE OPERATING DUMP
RELEASE BEFORE TRAVEL
800122
SAFETY FIRST
A CAREFUL WORKER IS THE BEST SAFETY DEVICE
THINK
SAFETY INSTRUCTIONS
Lock front wheels straight ahead for on-rail travel. 800115
CAUTION
RELIEF VALVE SETTINGS 2900 PSI, FRONT
1500 PSI, REAR
DO NOT exceed 2500 psi, front valve
DO NOT exceed 2000 psi, rear valve
DO NOT BOTTOM-OUT RELIEFS, IF ADJUSTED
800135
WITH APPLICATION OF HI-RAIL AND FINISHED BODY, THIS VEHICLE HAS
POUNDS OF AVAILABLE PAYLOAD
DATE OF COMPLETION OF HI-RAIL EQUIPPED VEHICLE: mo _____ yr _____
HI-RAIL VEHICLE COMPLETED BY _____
CAUTION THIS MOTORIZED VEHICLE HAS SPECIAL DESIGN AND PERFORMANCE FEATURES FOR OFF-ROAD USE. IT HANDLES DIFFERENTLY, BOTH ON AND OFF-ROAD, THAN CONVENTIONAL VEHICLES. OPERATORS MUST BE AWARE OF THESE CHARACTERISTICS WHEN THEY DRIVE ON STREETS, HIGHWAYS, AND OFF-ROAD.
WEIGHT AND LOCATION OF AVAILABLE PAYLOAD MAY ALSO AFFECT THE HANDLING OF THIS VEHICLE. DRIVE WITH CARE AND WEAR SAFETY BELTS AT ALL TIMES.
FOR PRECAUTIONS, READ THE VEHICLE OWNER'S GUIDE AND HI-RAIL OPERATORS SERVICE AND PARTS MANUAL. 800118
INSTRUCTIONS-
1. REMOVE SAFETY PINS
2. ACTIVATE VALVE
A. PUSH- RAIL POSITION
B. PULL- HIGHWAY POSITION
3. REPLACE SAFETY PINS IN PROPER LOCATION.
800117
INSPECTION AND MAINTENANCE OF D.M.F. GUIDE WHEEL SYSTEM
DAILY:
Visually inspect rail gear for hydraulic leaks, loose fasteners, and excessive wear.
Spin all four wheels noting any bearing noise or resistance.
Check level of hydraulic oil.
Compare left and right wheels for wear (particularly diagonal flanges).
WEEKLY:
Grease all fittings on rail.
Fourteen (14) on rear assembly.
Inspect the bearing grease every 2,000 miles or 6 months (whichever comes first).
Inspect bearings and grease cavity by removing hubcaps. Unless bearing problem is suspected, the bearings do not need to be removed or repacked. If repacking is required, the grease cavity should be only 80% filled with suitable grease. Replace hubcaps using a bead of Form-A-Gasket (or equal).
ANNUALLY:
Change hydraulic oil filter element.
DIVERSIFIED METAL FABRICATORS, (404) 875-1512 ATLANTA, GA
800114
OPERATION OF D.M.F. GUIDE WHEEL SYSTEM
TO PLACE VEHICLE ON RAIL
1. Drive vehicle on crossing, centering it over tracks.
2. Once centered over tracks, remove front and rear safety pins.
3. Lower rear wheels first.
A. If rear is not completely centered within rails, rear rail wheels will center truck on rail.
B. With rear wheels fully extended and properly centered on rail, install safety pin into lower hole on both sides.
4. Center front rail wheels over rail.
A. If front is not completely centered over rail, maneuver truck so that it is.
B. Front vehicle wheels must be straight ahead.
C. Lower front rail wheels until cylinders are fully retracted. Front rail wheels incorporate overcenter design and do not require safety pins in rail position.
5. Double check all flanges to ensure they are seated properly on rail and safety pins are installed.
6. Engage steering wheel lock if equipped.
Safe operating speeds on rail will be governed by track conditions and existing railroad rules and regulations. Under no conditions should vehicle be operated over 30 MPH on track.
DIVERSIFIED METAL FABRICATORS (404) 875-1512 ATLANTA, GA
800116
TO REMOVE VEHICLE FROM RAIL
1. Drive vehicle over road crossing.
2. Either front or rear wheels may be activated first.
3. Front rail wheels
A. Retract front rail wheels completely
B. Once retracted, install safety pins.
4. Rear rail wheels
A. Remove safety pins.
B. Fully retract rear rail wheels.
C. Re-install rear safety pins.
5. Double check all safety pins are in proper location.
6. Disengage steering wheel lock if equipped.
REV | DATE | DESCRIPTION | BY | APP
TITLE:
INSTRUCTION & SAFETY DECALS
DIVERSIFIED METAL FABRICATORS,INC.(404)875-1512
DRAWN BY: KLC
APPD BY:
DATE: 10/12/98
DRAWING NUMBER: FT1432A
REV: #

7.0 FINAL CHECKLIST

- ❑ Rail test the truck to check for good traction and braking. A good industrial siding or some authorized track time will be required. Check that rail wheels with brakes do not lock-up or slide.
- ❑ Adjust the rail gear height as required
- ❑ Cross check the Rear Railroader to the rear axle again.
- ❑ Weld the Mounting Plate to the Rear Frame Bracket with one 2" weld on the horizontal edges (two welds per Mounting Plate). Welding the plates must be done; **DO NOT** forget it.
- ❑ Double check all welds and fasteners, and Mounting Pin cotters. Tie strap all hydraulic, air hoses and electrical wires away from exhausts and moving parts. Insure that all hydraulic and air hoses have sufficient radius at bends.
- ❑ Top off the hydraulic oil in the tank.
- ❑ Touch-up the black acrylic enamel paint on the Front and Rear Railroaders.
- ❑ Raise the Railroaders (road position) and install all of the pin-offs.
- ❑ Apply the Decal Kit.
- ❑ Check tire pressures.

DMF RW-1420 Railroader Installation Check Sheet

Front Alignment

Front Mounting Pin height:	23-1/2 inches
Rear Mounting Pin height:	10-3/4 inches

Rear Alignment

	Single Axle	Tandem Axle
Tire to Rail Wheel center:	13-1/4 inches	9-1/4 inches
Minimum Truck Frame extension:	19-1/4 inches	15-1/4 inches
Calculated Spacer thickness (w/ 6" spacer)	= (6.0" -GAP) x 60%	

Check overall measurements:

Rear Truck Axle to Rear Railroader Axle (straight)	A = B (within 1/16")
Rear Truck Axle to Rear Railroader Axle (diagonal)	C = D (within 1/8")
Front Railroader to Rear Railroader (straight)	E = F (within 1/8")
Front Railroader to Rear Railroader (diagonal)	G = H (within 1/4")

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8.0 ENGAGING THE RAIL

8.1 Getting On the Rail

Lower rear guide-wheels first:

- At the track crossing, drive past the track, then back the vehicle onto the rails.
- Engage the truck's parking brake to prevent the truck from rolling.
- If the railgear has brakes, turn brake switch on.
- Engage the PTO.
- **Remove the safety pin-off pins (one each side).**
- Push / Pull valve handle to lower wheels to engage rail.
- When both wheels are fully down and properly engaging rail, **replace safety pin-off pins**.

NOTE:
Rear end can be articulated to facilitate alignment by operating one spool at a time.

Lower front guide-wheels:

- If necessary drive the truck into position to line up the front guide-wheels with the rail.
- Engage the PTO.
- **Remove the safety pin-off pins (one each side)** and stow in provided storage tubes.
- Check and make sure that the front guide-wheels line up with the rail, then engage wheels.

NOTE:
The front guide-wheel assembly is an over-center design and does not require safety pin-off pins engaged in the rail mode.

On the tracks:

- Do not exceed **30 MPH** while on the track. All railroad speed rules should be observed.
- Be aware that some high rail gear is insulated, and will not operate the crossing gate circuits.
- Reduce speed at all crossings, curves, branch lines, switches and frogs.
- Traction is reduced on the track, especially in wet conditions. Tire damage may result from spinning wheels on track.
- Braking distance is increased on the track, especially in wet conditions. Do not slide tires or guide-wheels on the tracks.
- **Do not exceed the maximum rated capacity of the equipment.**
- On newer trucks with Anti-Lock braking systems, the amber 'ABS' dash light may remain on with the front wheels elevated. This will not effect rear truck braking or rail wheel braking.

8.2 Getting Off the Rail

Removing truck from track:

- Engage the PTO and the truck parking brakes.
- Leave the truck running and the transmission in neutral gear.
- Lift both sets of railgear (there is no preference for removal order).
- **Engage the safety pin-off pins in highway position.**
- Disengage the switch that controls the railgear brakes (if applicable).
- Disengage the PTO before moving the truck.
- If the amber 'ABS' dash light remains on during rail operation, the truck engine must be turned off and restarted after returning to highway operation. This will clear the 'ABS' after a few seconds. If the amber light remains on during road operation, the truck's brake

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system may have an active fault and should be checked out. Please refer to the truck's operation manual.

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9.0 ROUTINE MAINTENANCE

9.1 Inspection & Maintenance

If your hi-rail vehicle is high-use or operated under extreme conditions, such as operating in mountainous regions or extreme temperatures, the levels of inspections listed below may need to be performed more frequently than stated.

The following are instructions for routine inspections recommended by Diversified Metal Fabricators. In some circumstances, government or corporate regulations may require additional inspections be performed. Please ensure that you are aware of any inspection requirements that pertain to your rail gear and that you abide by all local and national laws regarding rail gear maintenance and safety.

Daily Maintenance:

- Visually inspect for hydraulic fluid leaks.
- Check and make sure that all threaded fasteners are secured.

> **NOTE:**
> All hex nuts are either nylon insert or slotted hex nuts with cotter pins.

- Check and make sure all tie straps that secure hoses from moving parts and exhaust systems are in place. Replace if cracked or worn.
- Inspect wheel flanges for excessive wear, primarily noting difference in wear between wheels on the same axle or diagonally. If abnormal pattern is noted, check railgear alignment (see alignment procedure).

Weekly Maintenance:

In addition to the items listed in Daily Maintenance, perform the following:

- Grease and lubricate all grease fittings on front and rear railgear and guidewheel assemblies.

> **NOTE:**
> There are six (6) locations on front assemblies and fourteen (14) locations on rear assemblies.

- Check level of hydraulic oil and all other fluids.
- Check air pressure in tires and inflate to proper inflation pressure (if necessary).

Bi-annual Maintenance or as required:

In addition to the items listed in Daily Maintenance and Weekly Maintenance, perform the following:

- Remove the hubcaps from the railwheels and inspect for deterioration or loss of wheel bearing grease. Unless there is a problem, the cavity may be topped off with the recommended grease without removing and/or re-packing the bearings.
- Clean the hubcap and mating surfaces and apply a bead of silicone gasket and re-attach securely.
- Clean the strainer / filter in the hydraulic power unit tank.
- Inspect wheel flanges for excessive wear. If abnormal pattern is noted, check railgear alignment (see alignment procedure).
- Rail test for proper traction and braking. If abnormal, adjust properly (see traction procedure).

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Annual Maintenance or as required:

In addition to the items listed in Daily Maintenance, Weekly Maintenance and Bi-annual Maintenance, perform the following:

- Disassemble, inspect repack and reassemble Rail Wheel Bearings as shown in Section 5 (5.4.11/5.4.12 & 5.5.5).

9.2 Lubrication Specification

Hydraulic oil:

- Unax RX-46 hydraulic oil (or equal)

Wheel bearings / Grease Fittings:

- **Factory Standard:** Citgo Syndurance Premium Synthetic 460 #2
- **Warm Climates:** Mystik JT-6 Hi-Temp Multi-Purpose Grease #2 (or equivalent)

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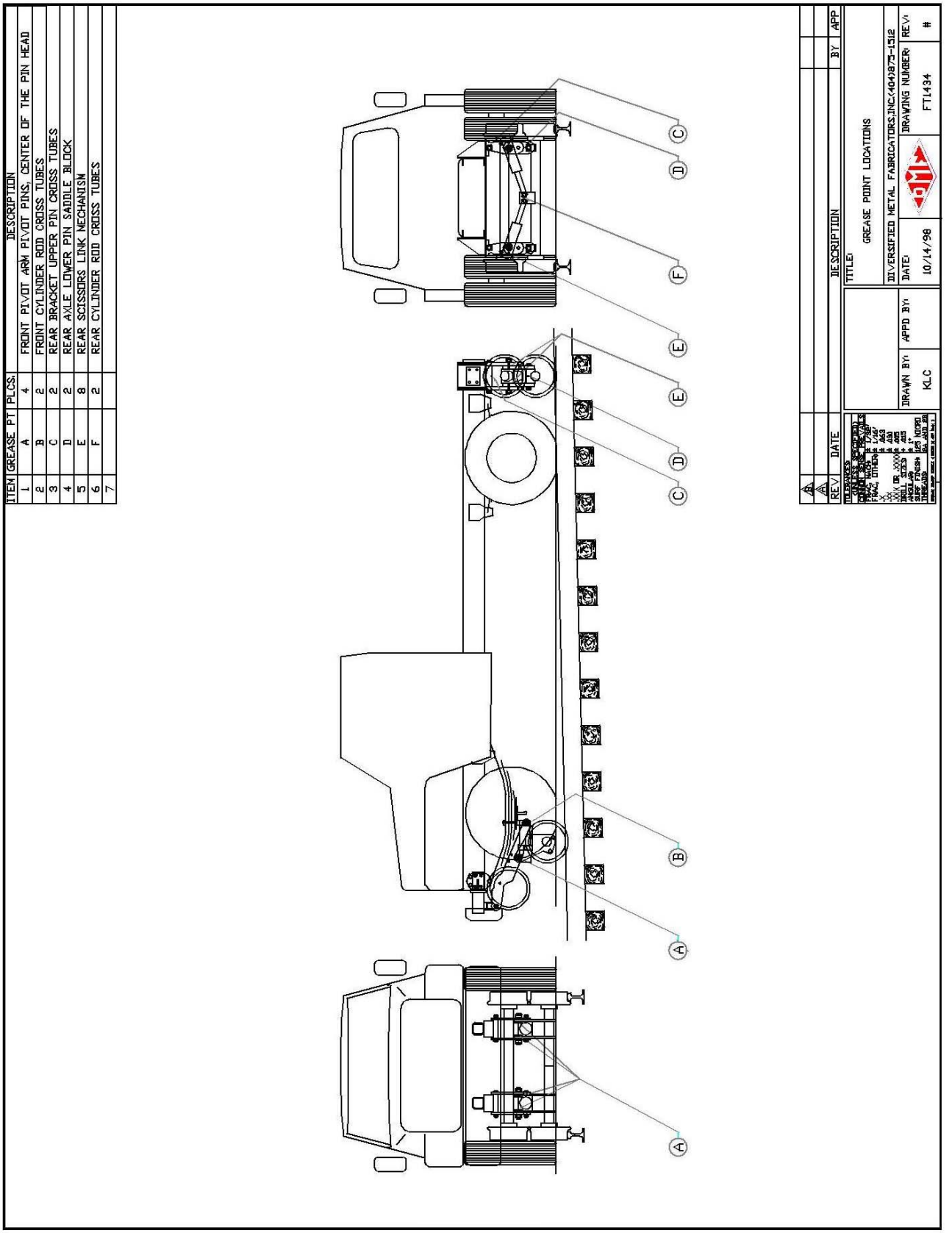
Drawing: Grease Point Locations


ITEM GREASE PT PLCS. DESCRIPTION
1 A 4 FRONT PIVOT ARM PIVOT PINS, CENTER OF THE PIN HEAD
2 B 2 FRONT CYLINDER ROD CROSS TUBES
3 C 2 REAR BRACKET UPPER PIN CROSS TUBES
4 D 2 REAR AXLE LOWER PIN SADDLE BLOCK
5 E 8 REAR SCISSORS LINK MECHANISM
6 F 2 REAR CYLINDER ROD CROSS TUBES
7
REV DATE DESCRIPTION BY APP
TITLE: GREASE POINT LOCATIONS
DRAWN BY KLC
APPD BY
DATE 10/14/98
DRAWING NUMBER FT1434
REV #
A
B
C
D
E
F

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APPENDIX A: TECHNICAL DATA

A.1 Working Pressure Ratings for SAE Hose and Fittings

The following table gives the recommended working pressures for SAE J517 Hose and SAE J516 Fittings:

Hose Diameter	100-R1	100-R2
-4	2750 psi	5000 psi
-6	2250 psi	4000 psi
-8	2000 psi	3500 psi
-12	1250 psi	2250 psi

Contact hose supplier to confirm that the hydraulic hoses and fittings meet these pressures ratings and that they conform to SAE J517 (Hydraulic Hoses) and SAE J516 (Hydraulic Fittings).

NOTE:
The SAE ratings for hoses can be found stamped on the hose outer surface.

A.2 Welding Information

- Dual Shield Wire spec. → AWS E71T-1
- Low Hydrogen spec. → AWS E-7018

Low Hydrogen Electrodes (AWS E-7018)

Manufacturer	Equivalent
Air Products	AP-7018, 7018IP
Airco	7018C, 7018-A1
Arcos	Ductilend 70
Air Products	170-LA, SW-47,616
Chemtron	170-LA, SW-47,616
Hobart	718, 718-SR
Marquette	7018
McKay Co	7018
Reid-Avery	7018
Uniblaze	7018
Westinghouse	Wiz-18
Lincoln	Jetweld LH-70

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A.3 SAE O-ring Fitting Installation

ITEM	PART NO.	QTY	DESCRIPTION
1			
2			

TITLE: SAE O-Ring Fitting Installation

PURPOSE: To Establish Production Methods For The Installation Of O-Ring Medium And High Pressure Hydraulic Fittings.

COMMON USAGE: Hydraulic Systems Operating With Petroleum-Based Fluids At Pressures Below 4000 PSI Or Minimum Component Rating.

PARTS GENERALLY ENCOMPASSED BY THIS PROCEDURE: Purchased Fittings With O-Ring Seals And SAE Straight Threads.

PROCEDURE:

- **A) Inspect to ensure that both mating parts are free of burrs, nicks, scratches or any foreign particles.**
- **B) Lubricate O-Ring with light coat of system fluid or compatible oil.**
- **C) For adjustable fittings, back off lock nut as far as possible. Make sure back up washer is not loose and is pushed up to nut.**
- **D) Screw fitting into port until finger tight. Back up washer (adjustable) or hex face (non-adj.) should contact port face. Light wrenching may be necessary.**
- **E) To align an adjustable fitting, unscrew by desired amount but not more than one full turn. Use wrench to hold in position. Screw nut down to port face until finger tight.**
- **F) Tighten lock nut (adjustable) or fitting (non-adj.) the indicated Flats From Finger Tight (F.F.F.T.) in either the Adjustable chart or the Non-Adjustable chart below. One Flat on a hex is equal to 1/6th of a full turn. Tolerance on tightening is plus or minus 1/4 flat (1/24th of full turn).**
- **G) Inspect to ensure that O-Ring is not pinched and back up washer/hex seats flat on face of port.**

ADJUSTABLE FITTINGS

Fitting Size	SAE Port Thread Size	F.F.F.T.
2	5/16-24	1.0
4	7/16-20	1.5
6	9/16-18	1.5
8	3/4-16	1.5
10	7/8-14	1.5
12	1 1/16-12	1.5
14	1 3/16-12	1.5
16	1 5/16-12	1.5
20	1 5/8-12	2.0
24	1 7/8-12	2.0

NON-ADJUSTABLE FITTINGS

Fitting Size	SAE Port Thread Size	F.F.F.T.
2	5/16-24	1.0
4	7/16-20	1.0
6	9/16-18	1.5
8	3/4-16	1.5
10	7/8-14	1.5
12	1 1/16-12	1.5
14	1 3/16-12	1.5
16	1 5/16-12	1.5
20	1 5/8-12	1.5
24	1 7/8-12	1.5

REV	DATE	DESCRIPTION	BY	APP
A				
A				
A				

DRAWN BY	APPD BY	DATE	TITLE: PRODUCTION PROCEDURE 003 O-RING FITTING INSTALLATION
TSH		06/02/94	DRAWING NUMBER PP003 REV A #

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A.4 NPT Pipe Thread Fitting Installation

ITEM	PART NO.	QTY	DESCRIPTION
1			
2			

TITLE: National Pipe Thread (NPT) Fitting Installation.

PURPOSE: To Establish Production Methods For The Installation Of NPT Medium Pressure Hydraulic Fittings.

COMMON USAGE: Hydraulic Systems Operating With Petroleum-Based Fluids At Pressures Below 3000 PSI Or Minimum Component Rating.

PARTS GENERALLY ENCOMPASSED BY THIS PROCEDURE: Purchased Fittings With Tapered Pipe Threads.

PROCEDURE: A) Inspect port components to ensure that male and female threads are free of nicks, burrs, dirt etc.

B) Apply sealant/lubricant to male pipe threads. Use only Permatex #14D "Thread Sealant With Teflon" paste (or Engineering approved equal). The first few threads must be left uncovered to avoid system contamination.

C) Screw fitting into female pipe port to the finger tight position.

D) Wrench tighten the fitting to the appropriate Turns From Finger Tight (T.F.F.T.) shown in chart below. Make sure that tube end of shaped fitting is aligned to receive in coming tube or hose assembly.

STEEL PIPE THREAD FITTINGS

Fitting Size	Pipe Thread Size, NPT	T.F.F.T.
2	1/8-27	2.0-2.5
4	1/8-27	2.0-2.5
6	1/4-18	1.5-2.0
8	3/8-18	2.0-2.5
10	1/2-14	2.0-2.5
12	3/4-14	1.5-2.0
14	3/4-14	1.5-2.0
16	1-11 1/2	1.5-2.0
20	1 1/4-11 1/2	1.5-2.0
24	1 1/2-11 1/2	1.5-2.0

COMMENTS: Teflon Tape May Be Used In Certain Situations With Engineering Approval. A Pipe Fitting Is Limited To One Or Two Re-Uses.

REV	DATE	DESCRIPTION	BY	APP

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES FRACT ± 1/32 .X ± .1 .XX ± .03 .XXX ± .005 ANGLES ± 2° SURFACE FINISH 125 MICRO INCH BREAK SHARP EDGES

DRAWN BY: TSH | APPD BY: | DATE: 06/02/94

TITLE: PRODUCTION PROCEDURE 004 PIPE FITTING INSTALLATION

DIVERSIFIED METAL FABRICATORS, INC (404) 875-1512

DRAWING NUMBER: PP004 | REV: #

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ITEM	PART NO.	QTY	DESCRIPTION
1			
2			

TITLE: SAE (JIC) 37 Degree Fitting Installation.

PURPOSE: To Establish Production Methods For The Installation Of SAE (JIC) Medium Pressure Hydraulic Fittings.

COMMON USAGE: Hydraulic Systems Operating With Petroleum-Based Fluids At Pressures Below 4000 PSI Or Minimum Component Rating.

PARTS GENERALLY ENCOMPASSED BY THIS PROCEDURE: Purchased Fittings With SAE (JIC) 37 Degree Flared Ends.

PROCEDURE: A) Inspect fitting components to ensure that mating parts are free of burrs, nicks, scratches or any foreign material.

B) Align tube flare against nose of fitting body and screw on the nut, finger tight, clamping the tube flare between the fitting nose and the nut.

C) Tighten the nut the indicated Flats From Finger Tight (F.F.F.T.) listed in the chart below. Use a second wrench to hold the hose in proper alignment while tightening to avoid twisting the lay line. One flat on a hex is equal to 1/6th of a full turn. Tolerance on tightening is plus or minus 1/4 flat (1/24th of full turn).

SAE (JIC) 37° Flare Fittings

Size	Thread Size	Tube Connection F.F.F.T.	Swivel Nut or Hose Connection F.F.F.T.
-4	7/16-20	2	2
-6	9/16-18	1.5	1.25
-8	3/4-16	1.5	1
-12	1 1/16-12	1.25	1
-16	1 5/16-12	1	1
-20	1 5/8-12	1	1
-24	1 7/8-12	1	1

REV	DATE	DESCRIPTION	BY	APP

TOLERANCES (UNLESS SPECIFIED): DECIMAL SIZES: PER CODE; FRACT. WATCH: ± 1/32"; FRAC. OTHER: ± 1/16"; .X: ± .063; .XX: ± .030; .XXX OR .XXXX: ± .005; DRILL SIZES: ± .005; ANGULAR: ± 1°; SURF FINISH: 125 MICRO; THREADS: 6A AND 6B; BREAK SHARP EDGES

TITLE: PRODUCTION PROCEEDURE 005 JIC FITTING INSTALLATION

DIVERSIFIED METAL FABRICATORS, INC (404) 875-1512

DRAWN BY:	APPD BY:	DATE:	DRAWING NUMBER:	REV:
TSH		06/02/94	PP005	#

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ITEM	PART NO.	QTY	DESCRIPTION
1			
2			

TITLE: Purchased Fastener Torque Specification

PURPOSE: To Establish Production Methods For The Installation Of Commonly Purchased Threaded Fasteners.

COMMON USAGE: Most Areas Of Multiple Part Assembly And Retention.

PARTS GENERALLY ENCOMPASSED BY THIS PROCEDURE: Most Common Sizes Of SAE J429 Grade 5 And 8 And Of ASTM A574 "Alloy" Bolts.

PROCEDURE: A) Identify The Fastener As Either Fine Or Coarse Thread, Select The Appropriate Chart Below.

B) Identify The Fastener Size (Diameter And Threads Per Inch), Select The Appropriate Row In The Chart Selected.

C) Identify Grade Of The Bolt.

D) Identify Whether The Bolt Is Plated Or Plain.

E) Read Across The Size Row And Down The Grade And Plain Or Plated Column. The Intersection Of Row And Column Gives Torque.

FINE THREAD BOLTS

SIZE (DIA-TPI)	SAE J429 GRADE 5 (3 MARKS) PLAIN (FTLB)	SAE J429 GRADE 5 (3 MARKS) PLATED (FTLB)	SAE J429 GRADE 8 (6 MARKS) PLAIN (FTLB)	SAE J429 GRADE 8 (6 MARKS) PLATED (FTLB)	ASTM A574 ALLOY (KNURLED OD) PLAIN (FTLB)	ASTM A574 ALLOY (KNURLED OD) PLATED (FTLB)
5/16-24	19	14	27	20	27	20
3/8-24	35	26	49	35	47	55
7/16-20	55	41	78	58	75	56
1/2-20	90	64	120	90	115	86
9/16-18	120	90	170	130	165	125
5/8-18	170	130	240	180	220	165
3/4-16	300	225	420	315	400	300
7/8-11	445	325	670	500	635	475
1-12	645	485	995	745	915	685
1 1/8-12	890	670	1445	1085	1385	1040
1 1/4-12	1240	930	2010	1510	1885	1415
1 3/8-12	1675	1255	2710	2035	2440	1830
1 1/2-12	2195	1645	3560	2670	3275	2455

COARSE THREAD BOLTS

RECOMMENDED TORQUE FOR GR 8 W/ PREVAILING TORQUE NUT (MATCHING HEX NUTS)

SIZE	FT-LB
1/2-13	55
1/2-20	60
5/8-11	120
5/8-18	125
3/4-10	180
3/4-16	180
1-8	400
1-14	425

SIZE (DIA-TPI)	SAE J429 GRADE 5 (3 MARKS) PLAIN (FTLB)	SAE J429 GRADE 5 (3 MARKS) PLATED (FTLB)	SAE J429 GRADE 8 (6 MARKS) PLAIN (FTLB)	SAE J429 GRADE 8 (6 MARKS) PLATED (FTLB)	ASTM A574 ALLOY (KNURLED OD) PLAIN (FTLB)	ASTM A574 ALLOY (KNURLED OD) PLATED (FTLB)
5/16-18	17	13	25	18	25	19
3/8-16	31	23	44	33	45	34
7/16-14	49	37	70	52	70	53
1/2-13	75	57	105	80	108	81
9/16-12	110	82	155	115	155	115
5/8-11	150	115	220	160	210	160
3/4-10	265	200	375	280	365	275
7/8-9	395	295	605	455	585	440
1-8	590	445	910	680	865	650
1 1/8-7	795	595	1290	965	1240	930
1 1/4-7	1120	840	1815	1360	1750	1315
1 3/8-6	1470	1100	2380	1780	2315	1735
1 1/2-6	1950	1460	3160	2370	3040	2280

COMMENTS: A) Torque values specified are for bolts with residual oils or no special lubricants applied. If special lubricants of high stress capacity (such as Never-Seez, graphite and oil, molybdenum disulphite, colloidal copper or white lead) are applied, multiply the torque values in charts by 0.90. The use of Loctite does not affect the torque values in charts.

B) All values are in Foot-Pounds (FTLB). Multiply by 12 for Inch-Pounds.

C) Flat washers of equal strength must be used.

D) Bolt manufacturer's specs should be used when available.

E) Plated values in charts are for Cadmium. Multiply by 1.87 for Zinc.

F) Never re-use a highly stressed, torqued fastener: IT MAY FAIL!

REV	DATE	DESCRIPTION	BY	APP
B				
A	12/29/99	ADDED RECOMMENDED TORQUE CHART	LQR	

TOLERANCES (UNLESS SPECIFIED): DECIMAL SIZES: DRILL SIZE OR LARGER; FRACT. MATCH: ± 1/32"; FRACT. OTHER: ± 1/16"; .X: ± .063; .XX: ± .030; .XXX OR .XXXX: ± .005; DRILL SIZES: ± .005; ANGULAR: ± 1°; SURF FINISH: 125 MICRO; THREADS: 6A AND 6B; BREAK SHARP EDGES

DRAWN BY: TSH | APPD BY:

TITLE: PRODUCTION PROCEDURE 006 FASTENER TORQUE SPECIFICATION

DIVERSIFIED METAL FABRICATORS, INC. (404) 875-1512

DATE: 06/02/94 | DRAWING NUMBER: PP006 | REV: A

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A.7 Railwheel Bearing Adjustment Guidelines

ITEM	PART NO.	QTY	DESCRIPTION
1			
2			

TITLE: Guidewheel Bearing Adjustment Guidelines.

PURPOSE: To Establish Production Methods For The Adjustment Of Wheel Bearings.

COMMON USAGE: Applicable To All Tapered Roller Bearing , Indirect Mounted, Fixed Spindle Bearing Systems.

ASSEMBLIES GENERALLY ENCOMPASSED BY THIS PROCEDURE: RW-1019, RW-1019HD, RW-1212, RW-1630, RW-1650 In Addition To Most Custom Units.

PROCEDURE: A) Assemble components per instructions or drawing details including grease packed in bearings and between bearing races.

B) Tighten the spindle adjusting nut, heavily by hand (25 to 50 ft-lb).

C) Rotate wheel one full turn in both directions.

D) Back off nut until loose, tighten nut by hand (while turning wheel) until slight bind is felt.

E) Back off nut until bearing axial end play is in the range of .005 to .010".

F) Secure position of nut by means provided.

SPECIFIC PROCEDURE BY MODEL:

RW-1013: Spindle Thread Pitch is 32 TPI.

A) Follow General Procedure above.

B) To achelve the setting In step "E" above, back adjusting nut off 1/4 turn.

A) Follow General Procedure above.

B) To achelve the setting In step "E" above, back adjusting nut off 1/8 turn.

RW-1630: Spindle Thread Pitch is 16 TPI.

A) Follow General Procedure above. An Impact wrench may be used for Initial assembly at up to 500 ft-lb.

B) To achelve setting In step "E" above, back adjusting nut off to next lockwasher hole but not more than 1/8 turn.

RW-1650: Spindle Thread Pitch Is 12 TPI.

A) Follow General Procedure above. An Impact wrench may be used for Initial assembly at up to 500 ft-lb.

B) To achelve setting in step "E" above, back adjusting nut off 1/12 turn (1/2 nut flat).

COMMENTS: Procedures Specifically Noted On Prints Must Be Performed With Preference Over This Procedure.

REV	DATE	DESCRIPTION	BY	APP
A	12/07/00	ADD RW-1013 SETTING	TSH	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES FRACT ±1/64 .X ±.1 .XX ±.03 .XXX ±.005 ANGLES ±2° BREAK SHARP EDGES

DRAWN BY	APPD BY	TITLE: PRODUCTION PROCEDURE 007 WHEEL BEARING ADJUSTMENT	DIVERSIFIED METAL FABRICATORS, INC (404) 875-1512	
TSH		DATE: 06/03/94	DRAWING NUMBER: PP007	REV: A

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A.8 Hi-rail Cylinder Assembly Procedure

ITEM	PART NO.	QTY	DESCRIPTION
1			
2			

TITLE: Cylinder Assembly

PURPOSE: To Establish Production Methods For The Assembly Of Cylinders

COMMON USAGE: All Models

PARTS GENERALLY ENCOMPASSED BY THIS PROCEDURE: D.M.F. Manufactured Hydraulic Cylinders With "PolyPack" Piston Seals; P/N 240099/100 (4.5 FT 1630 R/L, 240200/203 3.5 RR 1630 R/L, 240205/206 3.5 RR 1630 T-1 R/L, 240300/301 3.5 ROTO R/L, 240350 3.5 GRADALL, 240400/415 5.5 FT 1630 R/L, 240700/701 4.5 FT 1019 L/R, 240800/801 3.5 FT 1019 L/R, 241400/401 2.5 RR 1019 L/R, 241500/501 2.5 RR 1019 L/R.

ASSEMBLY PROCEDURE:

PISTON: A) Inspect for sharp edges. Deburr as necessary.
B) Clean and blow off with shop air.
C) Use clean hydraulic oil to aid in assembly.
D) Install two (2) seals with each lip (o'ring insert side) facing the closer piston face.

GLAND: A) Inspect OD and bore for sharp edges. Deburr as necessary.
B) Clean and blow off with shop air.
C) Use clean hydraulic oil to aid in assembly.
D) Install wiper ring in bore with lip facing outboard.
E) Install seal in bore with lip (o'ring insert side) facing inboard.
F) Inspect for seal damage. Any shaved seal material requires replacement.
G) Install backing ring in O'ring groove on OD with concave surface facing inboard.
H) Install O'ring on inboard side of groove in Step G.
I) Inspect O'ring for damage.

ROD ASSEMBLY:
A) Clean and inspect shaft surface for scratches and dings.
B) Install grease fitting in rod end per PP001.
C) Use clean hydraulic oil to aid in assembly.
D) Install gland assembly onto rod with the outboard side facing the rod end.
E) Install rod O'ring onto threaded end of rod.
F) Inspect O'ring for damage.
G) Install piston assembly onto rod with the O'ring counterbore facing O'ring in Step E. Be certain that O'ring seats in counterbore.
H) Install self locking rod nut on rod. Tighten to 200 to 300 foot-pounds torque.

CYLINDER ASSEMBLY:
A) Inspect cylinder ports for minimum three (3) threads and no burrs. Deburr as necessary.
B) Clean tube ID threads and bore and blow out with shop air.
C) Inspect threads for debris.
D) Support cylinder barrel assembly with gland end facing up.
E) Dip piston end of rod assembly into clean hydraulic oil. Maintain rod assembly in vertical position, align piston with tube bore, engage piston in tube bore, strike rod end with hammer until piston is below first cylinder port.
F) Slide gland down on rod, engage gland threads into barrel by hand.
G) Screw gland into barrel with spanner wrench until gland face contacts barrel tube-end.
H) Install two (2) hydraulic fittings into cylinder ports per PP003.

PRESSURE TESTING:
A) Connect hydraulic power unit to cylinder.
B) Operate cylinder through complete cycle to purge air and fill with clean hydraulic oil.
C) Operate cylinder to full extension and retraction and maintain at 3300 PSI for 15 seconds at each extent. While maintaining pressure at each extent, visually inspect ports, rod seal, gland OD seal, and cylinder bottom areas for leakage.
D) Disconnect hydraulic power unit and install caps on port fittings.
E) Impression stamp cylinder bottom when all preceding steps have been successfully accomplished.

COMMENTS: Specific assembly instructions on prints are performed with preference over this procedure.

REV	DATE	DESCRIPTION	BY	APP

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES FRACT ± 1/64 DECIMAL .X ± .1 .XX ± .03 .XXX ± .005 ANGLES ± 2° SURFACE FINISH ± 125 MICRO INCHES

DRAWN BY: TSH
APPD BY:
DATE: 06/24/94

TITLE: PRODUCTION PROCEDURE 009 CYLINDER ASSEMBLY

DIVERSIFIED METAL FABRICATORS, INC (404) 875-1512

DRAWING NUMBER: PP009

REV: #

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DMF LIMITED WARRANTY POLICY

Diversified Metal Fabricators (DMF) products are designed to provide the utmost service and reliability. Competent workmen, guided by stringent quality standards, manufacture the products from high-grade material. **DMF** warrants products of its manufacturer to be free of defects in material and workmanship, under normal use and service, for a period of **ONE CALENDAR YEAR**. **DMF's** obligation under this warranty is limited to repairing or replacing at its factory, or other location designated by us, any part or parts there-of which shall, within 30 DAYS of the date of failure or notice of defect, be returned, and which upon examination shall appear to **DMF's** satisfaction to have been defective. Such repair or replacement does not include the cost of installing the new part or any other expenses incident thereto; however, the outbound direct ground freight on the part will be prepaid to locations within the continental United States and Canada. **DMF** shall not be liable for other loss, damage, or expense directly or indirectly arising from the use of its products.

Ordinary wear and tear, abuse, misuse, neglect, or alteration is not covered by this warranty. **DMF** assumes no liability for expenses or repairs made outside its factory except by written consent. Warranty is null and void if instructions and operating procedures specifically referring to warranty coverage are not followed.

Equipment or parts not manufactured by this company, but which are furnished in connection with **DMF** products are covered directly and solely by the warranty of the manufacturer supplying them.

This warranty is in lieu of other warranties, expressed or implied, including any implied warranties of merchantability or fitness for a particular purpose and any liability for special or consequential damages.

All warranty claims must reference a serial number. Returns must reference a RMA number.

DMF
ATLANTA

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